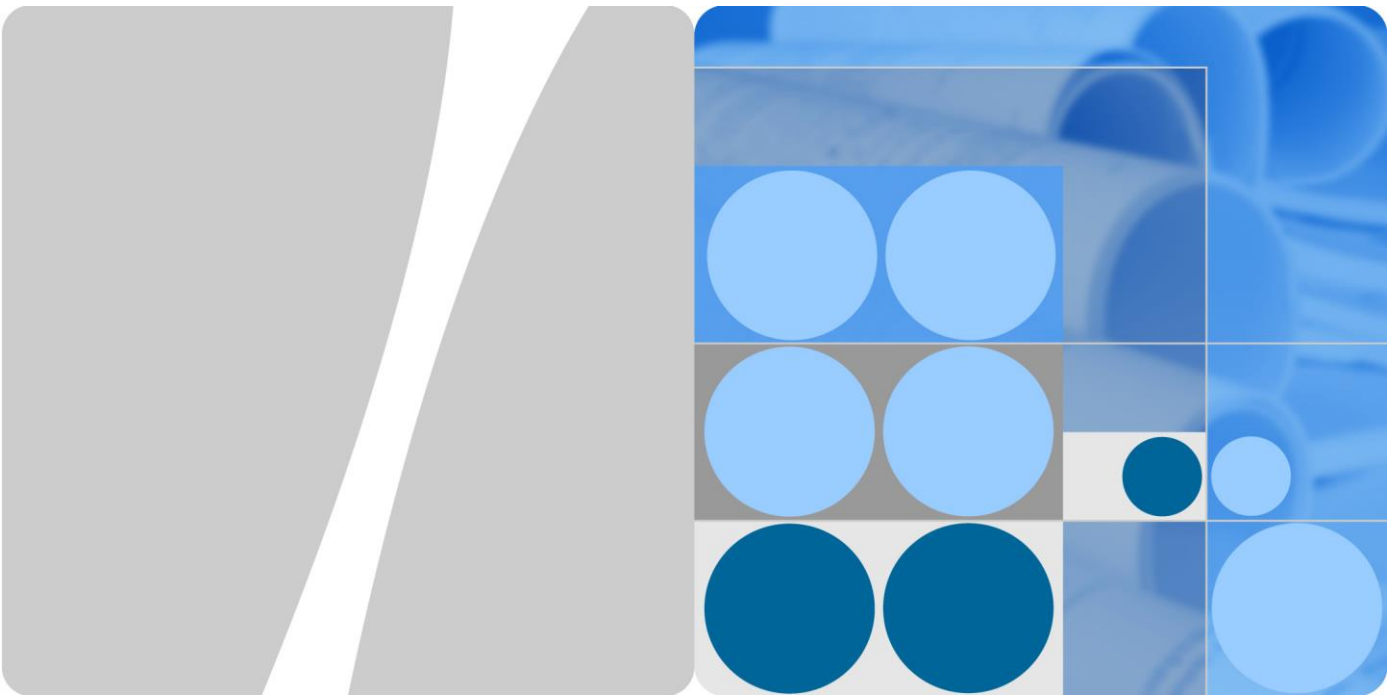

UPS5000-S-(350 kVA-880 kVA)

User Manual

Issue 01

Date 2019-01-25

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About This Document

Purpose

This document describes the UPS5000-S-(350 kVA-880 kVA) in terms of its features, performance, working principles, appearance as well as instructions for installation, and operation and maintenance (O&M).

Intended Audience

This document is intended for:

- Sales engineers
- Technical support engineers
- System engineers
- Hardware installation engineers
- Commissioning engineers
- Data configuration engineers
- Maintenance engineers

Symbol Conventions

The symbols that may be found in this document are defined as follows.

Symbol	Description
	Indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury.
	Indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.
	Indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury.
	Indicates a potentially hazardous situation which, if not avoided, could result in equipment damage, data loss, performance deterioration, or unanticipated results.

Symbol	Description
	NOTICE is used to address practices not related to personal injury.
NOTE	Calls attention to important information, best practices and tips. NOTE is used to address information not related to personal injury, equipment damage, and environment deterioration.

Change History

Changes between document issues are cumulative. The latest document issue contains all the changes made in earlier issues.

Issue 01 (2018-01-25)

This issue is the first official release.

Contents

1 Safety Precautions

1.1 General Safety

This section describes safety precautions to consider before installing, maintaining, and operating the UPS.

NOTICE

- To minimize the risk of personal injury and damage to equipment, read and follow all the precautions in this document before performing any operation. The "DANGER", "WARNING", "CAUTION", and "NOTICE" statements in this document are only supplemental and do not represent all the safety instructions.
- Only trained and qualified personnel are allowed to install, operate, and maintain Huawei equipment.

Follow the precautions and special safety instructions provided by Huawei when operating Huawei products. Huawei will not be liable for any consequences that are caused due to violations regarding general safety regulations and equipment design, production, and usage safety standards.

Declaration

Huawei does not take responsibilities for the following situations:

- Operation under severe environments that are not specified in this document.
- Installation or use in environments that are not specified in related international standards.
- Unauthorized product changes and software code modification.
- Operations not complying with the operation instructions and safety precautions in this document.
- Damage caused by extreme natural environments.
- Damage caused by using batteries provided by Huawei for non-Huawei UPSs.
- Damage caused by using batteries not provided by Huawei.

Power Grid Requirements

A standard UPS can connect to a three-phase, five-wire (L1, L2, L3, N, PE) TT, TN-C, TN-S, and TN-C-S AC power distribution system (IEC60364-1).

Local Laws and Regulations

Equipment operations must comply with local laws and regulations. The safety instructions in this document are only supplemental to local safety regulations.

Personal Requirements

DANGER

Only Huawei engineers or engineers certified by Huawei are allowed to perform UPS commissioning and maintenance. Otherwise, human injury or equipment damage may occur, and any resulting UPS faults will be beyond warranty scope.

Personnel who plan to install or maintain Huawei equipment must receive thorough training, understand all necessary safety precautions, and master the correct operation methods. Trained and qualified personnel, or personnel certified or authorized by Huawei are:

- Allowed to install, operate, and maintain the equipment.
- Allowed to remove safety facilities and inspect the equipment.
- Allowed to replace or change the devices or components (including software).
- Operation personnel must report faults or errors that might cause serious safety issues to related owners.
- This product should be installed and used according to the installation and technical, specification requirements found in this manual. Otherwise, the product may be damaged, and the resulting product exceptions or component damage will be beyond the warranty scope.

Grounding Requirements

Devices to be grounded (excluding the energy storage unit) must meet the following requirements:

- When installing a device, install the ground cable first. When removing a device, remove the ground cable at the very end.
- Do not damage the ground conductor.
- Do not operate devices if the ground conductor is not installed. Before operating a device, check the electrical connection of the device to ensure that it is securely grounded.

Personal Safety

- Do not operate the product, or handle cables, during thunderstorms.
- To avoid electric shocks, do not connect safety extra-low voltage (SELV) circuits to telecommunication network voltage (TNV) circuits.

- Before operating a device, wear electrostatic discharge (ESD) clothes, ESD gloves, and an ESD wrist strap. Remove any conductors (such as jewelry or watches) before the operation to avoid electric shocks or burns.
- In the case of fire, leave the building or the equipment room immediately, and turn on the fire alarm bell or make an emergency call. Never enter the building on fire in any case.
- If the cabinet provides an ESD jack, wear an ESD wrist strap and insert the ground terminal of the ESD wrist strap into the jack.
- Ensure all switches are turned to OFF during device installation.
- Power on the UPS only after authorized engineers arrive at the site.
- If a C2 UPS is used in residential areas, additional measures must be taken to prevent radio frequency interferences.
- If the UPS is used for life-supporting medical apparatus and facilities such as lifts where adequate care has to be taken to ensure personal safety, discuss with the manufacturer in advance about the applicability, settings, management, and maintenance of the UPS, which require special considerations during design.

Device Safety

- Before operation, ensure that the device is firmly anchored to the floor or other solid objects, such as a wall or an installation rack.
- Ensure ventilation vents are unblocked while the system is operating.
- Before powering on the device, ensure that all the screws inside it are securely tightened and will not fall off during operation.
- After the installation, remove packing materials from the equipment area.
- Replace danger signs that have worn out or are unreadable.
- A UPS can be used to serve resistive-capacitive loads, resistive loads, and micro-inductive loads. It is recommended that a UPS not be used for pure capacitive loads, pure inductive loads, and half-wave rectification loads. It does not apply to energy feedback loads.
- Do not alter the UPS internal structure or installation procedure unless consent from the manufacturer is given.
- Never use water to clean electrical components inside or outside the UPS.
- Do not drill holes into a cabinet.

1.2 Electrical Safety

High Voltage

DANGER

- The high voltage power supply provides power for the device operation. Direct or indirect contact with high voltage power sources may result in fatal injury.
- Non-standard or incorrect high voltage operations may result in fire and electric shocks.

- The personnel who install the AC facility must be qualified to perform high voltage and AC operations.

- When selecting, connecting, and routing power cables, ensure compliance with local laws and regulations.
- When operating the AC power supply facility, ensure compliance with local laws and regulations.
- Before connecting cables to the UPS, ensure that the input power and mains power distribution switches and output power distribution switch are turned off.
- Use only dedicated tools during high voltage and AC operations.
- If the operation is performed in a damp environment, ensure that the device is dry. When water is found in the rack or the rack is damp, switch off the power supply immediately.

High Leakage Current

DANGER

- Ground a device before powering it on. Otherwise, personal injury or device damage may occur.
- If a "high leakage current" tag is attached to the panel of the device, ground the protective ground terminal on the device enclosure before connecting the AC power supply to prevent electric shocks.
- The UPS can generate high leakage currents. Using a circuit breaker that has the leakage current protection function is not recommended.

Power Cable

DANGER

Do not install or remove power cables when the device is on. Transient contact between the core of the power cable and the conductor may generate electric arcs or sparks, which may cause fire or damage eyesight.

- Before moving or reconnecting the UPS, disconnect the mains and batteries, open the output power distribution switch, and wait a period of at least 5 minutes after the UPS completely powers off. Otherwise, electric shocks may occur.
- Before installing or removing the power cable, open the power switch.
- Before connecting a power cable, check that its label is correct.

Fuse

NOTICE

If a fuse needs replacing, ensure the new fuse is of the same type and specifications so that the system runs safely.

Backfeed Protection Dry Contact

The UPS can be configured with a backfeed protection dry contact to work with an external automatic circuit breaker, preventing the voltage from flowing back to input terminals over static bypass circuits. If device installation and maintenance personnel do not need to use backfeed protection, paste labels on the external bypass input circuit breakers informing that the circuit is connected to the UPS. Disconnect the device from the UPS before performing operations on the circuit.

Electrostatic Discharge

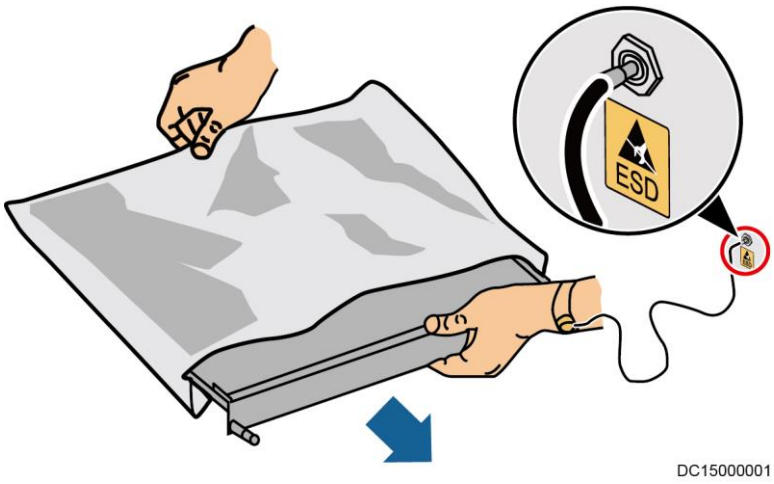
NOTICE

Static electricity generated by human bodies may damage the electrostatic-sensitive components on boards, for example, the large-scale integrated (LSI) circuits.

- Wear a pair of ESD gloves or a well-grounded ESD wrist strap when touching the device or handling boards or application-specific integrated circuits (ASICs).
- When holding a board, hold its edge without touching any components, especially chips.
- Package boards with ESD packaging materials before storing or transporting them.

Figure 1-1 shows how to wear an ESD wrist strap.

Figure 1-1 Wearing an ESD wrist strap



Liquid Prevention

- Do not place the product under areas prone to water leakage, such as near air conditioner vents, ventilation vents, or feeder windows of the equipment room. Ensure that there is no condensation inside the product or equipment room. Ensure that no liquid enters the product. Otherwise, short circuits will occur and may result in serious injury or death.
- If any liquid is detected inside the product, immediately disconnect the power supply and contact the administrator.

1.3 Operating Environment

The UPS is used for commercial and industrial purposes only. It cannot be used as a power supply for life support devices.

The TIER4 or TIER3 power supply architecture specified in TIA942, that is, dual power supply routes, must be used in the power supply systems that are crucial to major economic interests or order of public places, such as the national computing center, military command system, emergency command center, railway signal system and control center, civil aviation air traffic control center, airport command center, financial clearing center, and transaction center.

The UPS operating environment must meet the requirements for the climate indicator, mechanically active substance indicator, and chemically active substance indicator in ETSI EN 300 019-1 class 3.6.

DANGER

Do not expose the equipment or perform any operations in an environment with flammable or explosive gas, or smoke.

Any operation on any electrical device in an environment that has flammable air can cause extreme danger. Strictly obey the operating environmental requirements specified in related use manuals when using or storing the device.

Do not use the UPS in the following environments:

- Environment containing flammable gases, corrosive gases, abnormal vibrations, and impacts.
- Non-confined environment near the ocean (0–3.7 km) and indoor or semi-indoor environment where the temperature and humidity are not controllable, such as a simple equipment room near the ocean, citizen house, garage, corridor, direct ventilation cabinet, house with only the roof, railway station platform, gymnasium, aquarium, and so on.

1.4 Battery Safety

This section describes precautions for operating batteries.

DANGER

Before operating batteries, carefully read the safety precautions to ensure correct battery handling and connection is performed, and personal safety is managed.

NOTICE

- To ensure battery safety and efficient battery management, use the batteries delivered with the UPS. Huawei shall not be responsible for battery damage caused by using non-Huawei batteries for Huawei UPSs.
- Ensure lead-acid battery handling is in accordance with local regulations.

- Incorrect handling of batteries may cause hazards. When operating batteries, avoid battery short circuits and electrolyte overflow or leakage.
- Electrolyte overflow may damage the device by corroding metal parts and circuit boards, and ultimately damaging the circuit boards.
- Short circuits caused by incorrect operations may cause serious injuries due to high power of batteries.
- Do not reversely connect positive and negative battery terminals.
- Use batteries of the specified type. Otherwise, the batteries may be damaged.
- Check battery connections periodically to ensure that all screws are securely tightened.
- Install or store batteries in clean, cool, and dry environments.
- Do not decompose, transform, or damage batteries. Otherwise, battery short circuit, electrolyte leakage, and even personal injury may occur.

Preventative Measures

When installing and maintaining batteries, pay attention to the following points:

- Use dedicated insulated tools.
- Take measures to protect eyes, such as using eye protection devices.
- Avoid skin contact with electrolyte overflow. Wear rubber gloves and protective clothing.
- When handling a battery, ensure that its electrodes always point upward. Do not tilt or overturn batteries.
- Switch off the power supply during installation and maintenance.

Short Circuit

DANGER

Battery short circuits may cause personal injury. The high transient current generated by a short circuit may release a surge of power and cause a fire.

To avoid battery short circuits, do not maintain batteries while they are in use.

Harmful Gas

DANGER

Do not use unsealed lead-acid batteries. Lead-acid batteries emit flammable gas. Therefore, place and secure lead-acid batteries horizontally to prevent fire or corrosion.

Store lead-acid batteries in a place with good ventilation, and take fire safety precautions.

Battery Temperature

DANGER

High temperature may result in battery distortion, damage, and electrolyte overflow.

- Install or store batteries far away from fire sources and heating devices such as transformers. Never burn batteries.
- If the battery temperature exceeds 60°C, check the battery for electrolyte overflow. If electrolyte overflows, handle the leakage immediately.

Electrolyte Leakage

DANGER

In the case of electrolyte leakage, counteract and absorb the leaking electrolyte immediately.

When moving or handling a battery whose electrolyte leaks, note that the leaking electrolyte may harm human bodies. If the electrolyte leaks, use the following substances to counteract and absorb the leaking electrolyte:

- Sodium bicarbonate (baking soda): $NaHCO_3$
- Sodium carbonate (soda): Na_2CO_3

When using substances to counteract and absorb electrolytes, strictly follow the guidelines provided by the battery manufacturer.

If any personnel are exposed to battery electrolyte, wash the exposed area with clean water immediately and seek medical advice if the situation is serious.

1.5 Mechanical Safety

Moving Sharp Objects

CAUTION

Wear protective gloves when moving sharp objects.

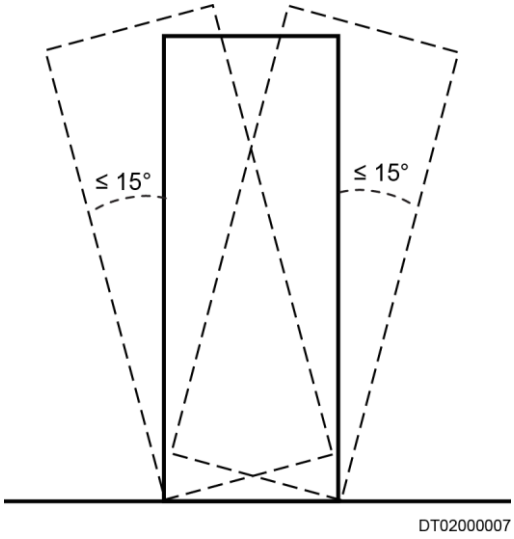
Moving Heavy Objects

DANGER

- Perform operations in accordance with all instructional symbols on the device.
- Take caution to avoid injury when moving heavy objects.

- When moving or lifting a device, hold the handle or bottom of the device.
- When transporting a device using a pallet truck, the forks must be properly positioned to ensure that the device does not topple. No excessive tilt or jolt is allowed during the transportation, and the maximum tolerance of the tilting angle during loading and unloading is 15°. To avoid toppling, secure the device to the pallet truck by using ropes before moving, and assign persons to watch out the device during movement.
- Move the cabinet with caution. Any bumping or falling may damage the device.

Figure 1-2 Tilting angle of a cabinet



Handling Fans

Do not insert fingers or boards into the operating fans until the fans are switched off, and have stopped running.

1.6 Laying Out Cables

Binding Signal Cables

NOTICE

Signal cables must be bound separately from strong-current cables and high-voltage cables.

Laying Out Cables

When the temperature is low, a violent strike or vibrations may damage the cable sheathing. To ensure cable safety, comply with the following requirements:

- Cables can be laid, or installed, only when the temperature is higher than 0°C (32°F). Handle cables with caution, especially at lower temperatures.
- Before laying out cables that have been stored in temperatures lower than 0°C (32°F), move the cables to an environment that is at the requisite ambient temperature. Store them in this environment for at least 24 hours.
- Do not drop the cables directly from the vehicle.
- As the insulation layer of a cable may age, or be damaged from high temperatures, ensure a sufficient distance between cables and the DC busbars, shunts, and fuses. Cables prepared by the customer should be flame resistant. Cables must not be routed behind the air exhaust vent of the cabinet. The air exhaust vent should not be blocked by any object.

Before connecting a cable, ensure that the cable and cable label to be used meet the actual installation requirements.

1.7 Information About Foreign Objects near UPS Equipment Installation

The purpose of this note is to provide information and warnings about the potential risks of the operational integrity of an installed UPS. These risks are caused by foreign objects in or near the UPS modules and relevant auxiliary equipment/components.

These risks are particularly high if conductive materials have entered the UPS modules/units or the channels in the relevant auxiliary equipment/components.

Potential risks include damage to installed UPS equipment and subsequent power derating and power failure of loads at critical positions.

Huawei UPS uses the highest safety standard in equipment design to ensure that live parts are not in contact with the exterior and that no foreign object will enter the equipment during operation.

However, when the UPS baffle plate and cover are open and the electrical wiring terminals are exposed by the electrical contractor/installation personnel who are setting up a power line connection, it is almost impossible to ensure that no foreign object will enter Huawei UPS during onsite installation.

It is common to have someone working in the same room as the UPS during onsite installation. Sometimes some people may be working above the UPS and relevant auxiliary equipment/components.

To avoid serious damage to the onsite operation, property hazards, and personal injury including fatal injury, it is the responsibility of each equipment manager or construction

manager to ensure that no foreign object enters the UPS modules/units or relevant auxiliary equipment/components.

2 Overview

2.1 Model Description

This document describes the following UPS models:

- UPS5000-S-400K-SM
- UPS5000-S-400K-FM
- UPS5000-S-500K-SM
- UPS5000-S-500K-FM
- UPS5000-S-600K-SM
- UPS5000-S-600K-FM
- UPS5000-S-880K-SM
- UPS5000-S-880K-FM

Figure 2-1 numerically labels UPS model number details, and Table 2-1 describes these details.

Figure 2-1 UPS model number

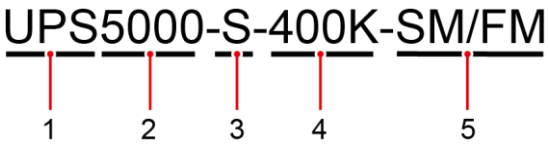


Table 2-1 Model number details

No.	Item	Description
1	Product category	UPS, short for uninterruptible power system
2	UPS family	5000
3	UPS subcategory	S series
4	Output	• 400K: The output capacity is 400 kVA.

No.	Item	Description
	capacity	• 500K: The output capacity is 500 kVA. • 600K: The output capacity is 600 kVA. • 880K: The output capacity is 880 kVA.
5	Configuration type	• SM: standard configuration • FM: full configuration

NOTE

- The UPS5000-S-400K-SM/FM uses 50 kVA power modules. It can expand up to 400 kVA and is compatible downwards to 50 kVA. This document describes the 400 kVA UPS.
- The UPS5000-S-500K-SM/FM uses 50 kVA power modules. It can expand up to 500 kVA and is compatible downwards to 50 kVA. This document describes the 500 kVA UPS.
- The UPS5000-S-600K-SM/FM uses 50 kVA power modules. It can expand up to 600 kVA and is compatible downwards to 50 kVA. This document describes the 600 kVA UPS.
- The UPS5000-S-880K-SM/FM uses 50 kVA power modules. It can expand up to 880 kVA and is compatible downwards to 50 kVA. This document describes the 880 kVA UPS.

2.2 Working Principle

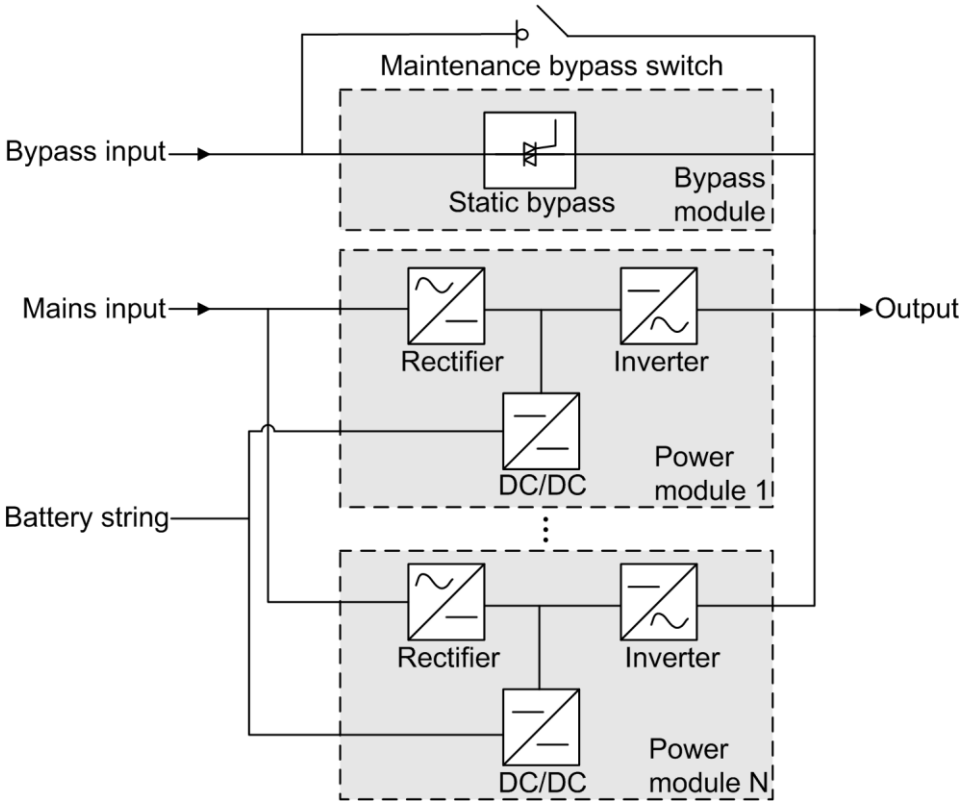
NOTE

- → indicates an input mode.
- ➡ indicates the energy flow direction.

2.2.1 Conceptual Diagram

The UPS5000 is an online product. It uses a modular design, which facilitates maintenance and capacity expansion. The UPS5000 uses the digital signal processing (DSP) technology for intelligent control. Its power module consists of a rectifier, inverter, and DC/DC converter. The UPS5000 converts inputs into pure high-quality sine wave outputs by using the high-frequency switching technology. Figure 2-2 shows the UPS conceptual diagram.

Figure 2-2 UPS conceptual diagram

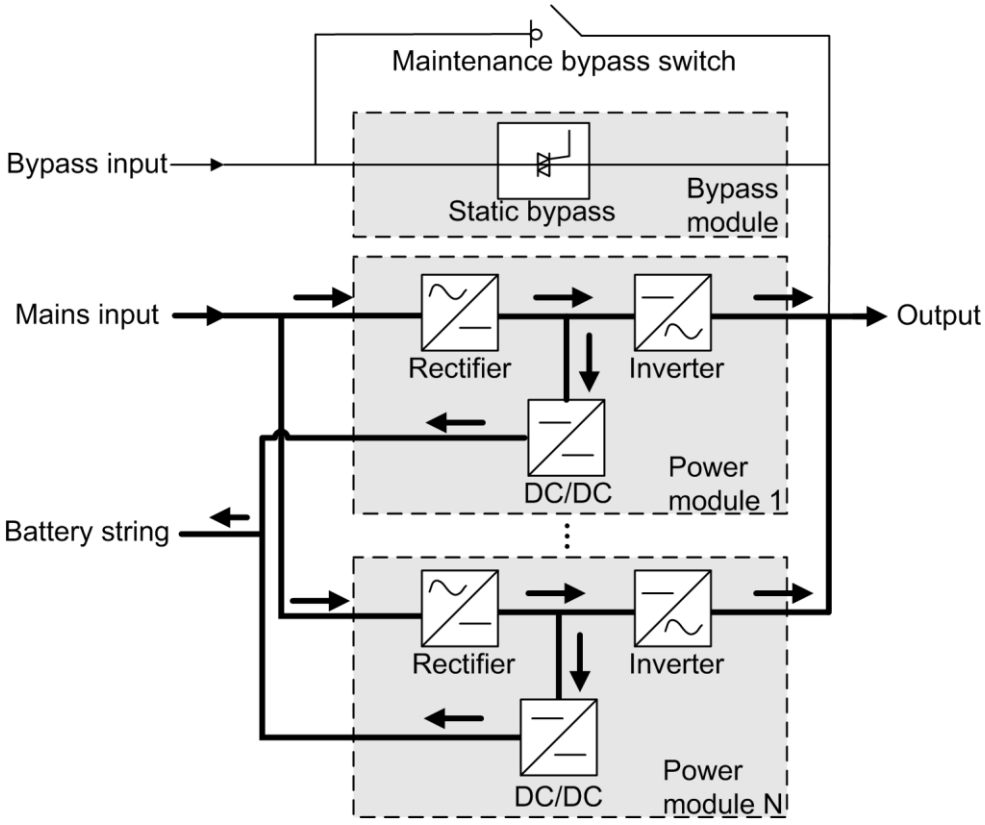


2.2.2 Working Modes

2.2.2.1 Normal Mode

In normal mode, the rectifier converts AC power into DC power, then the inverter converts DC power into high-precision AC outputs. The conversions protect loads from interference such as input harmonics, glitches, and voltage transients.

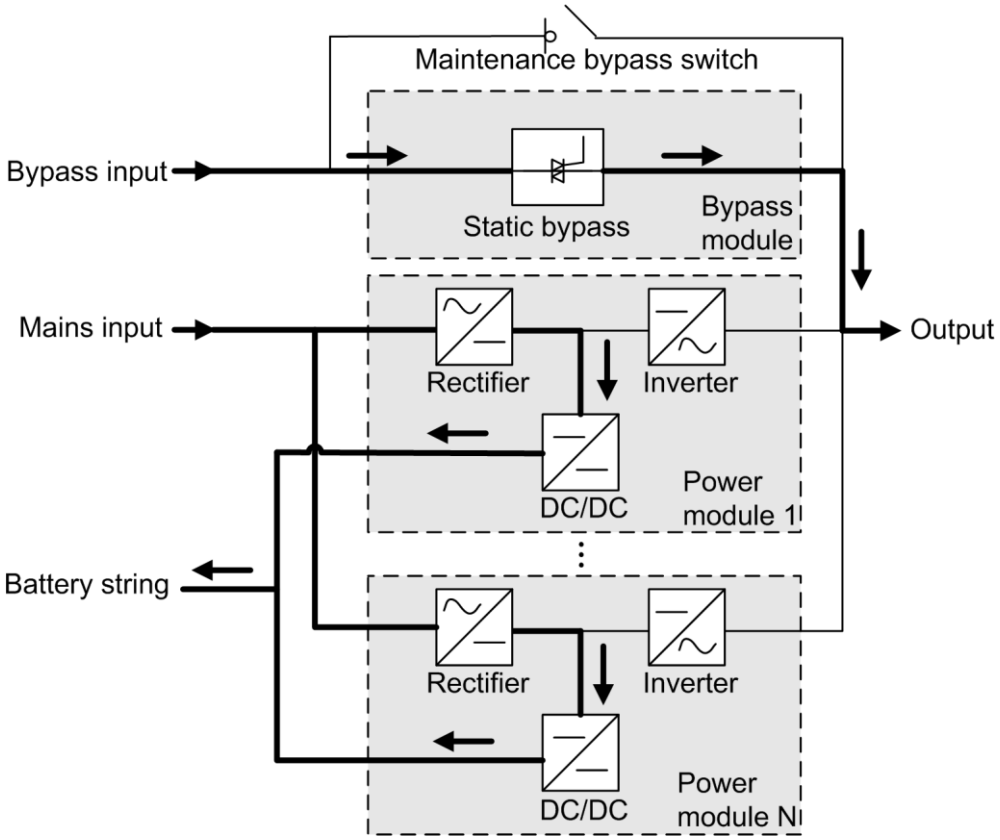
Figure 2-3 UPS conceptual diagram in normal mode



2.2.2.2 Bypass Mode

The UPS automatically transfers to bypass mode upon detecting power module overtemperature, overload, or other faults that may cause the inverter to shut down. The bypass power supply is not protected by the UPS which means it may be affected by mains outage, and incorrect AC voltage or frequency.

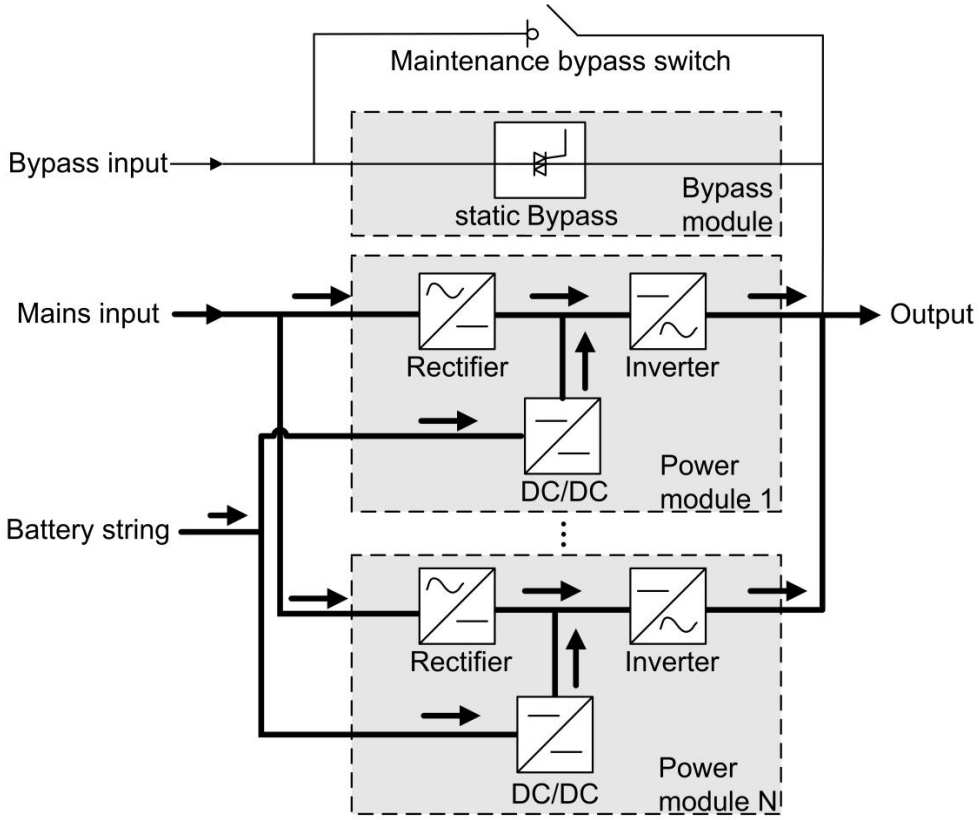
Figure 2-4 UPS conceptual diagram in bypass mode



2.2.2.3 Joint Power Mode

If the UPS works properly and the AC input power of the rectifiers is insufficient, the UPS transfers to joint power mode. In this case, the power module obtains energy from both the mains and batteries, and the energy is converted into AC outputs over the inverter.

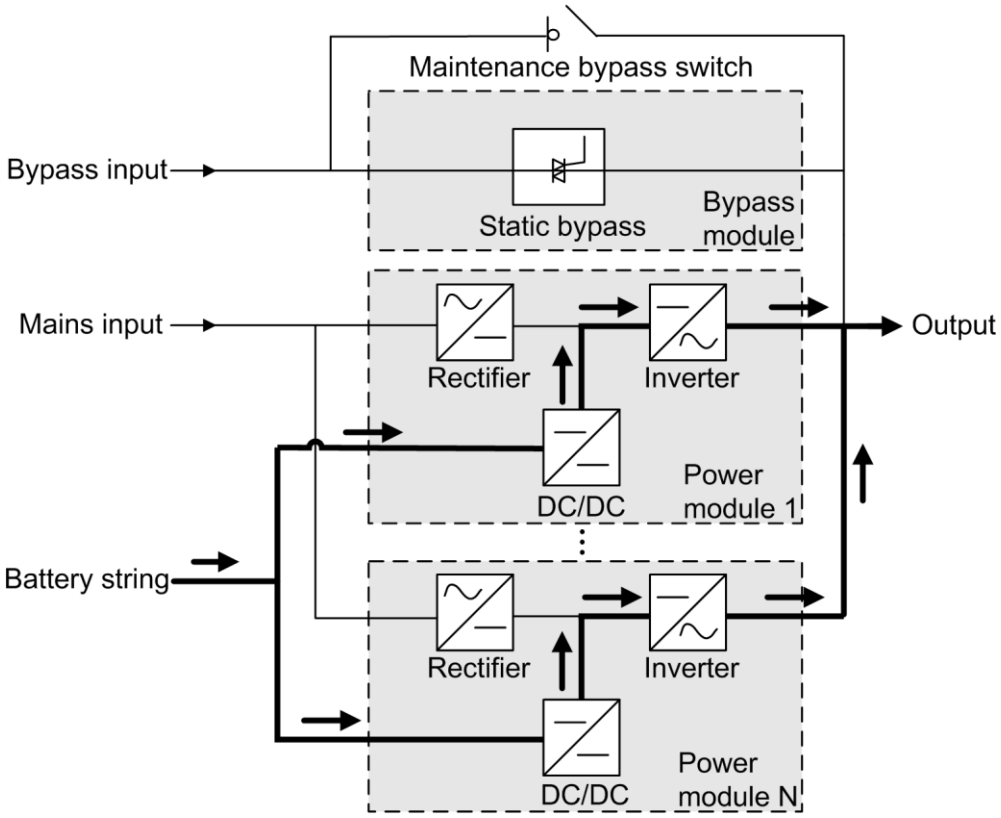
Figure 2-5 Conceptual diagram in joint power mode



2.2.2.4 Battery Mode

If the mains input is abnormal or the rectifier becomes abnormal, the UPS transfers to battery mode. The power module obtains DC power from batteries, and the power is converted into AC output by the inverter.

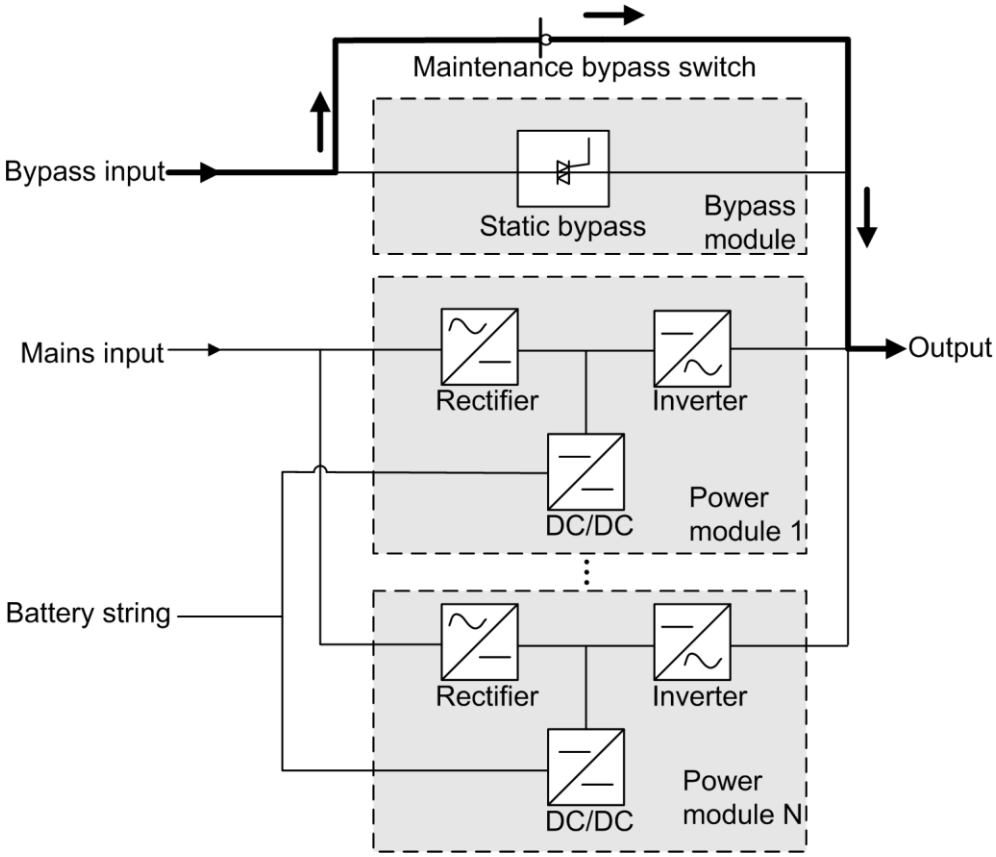
Figure 2-6 UPS conceptual diagram in battery mode



2.2.2.5 Maintenance Bypass Mode

When the UPS works in maintenance bypass mode, the current flows through the maintenance bypass instead of the power module. You can maintain the circuit inside the cabinet.

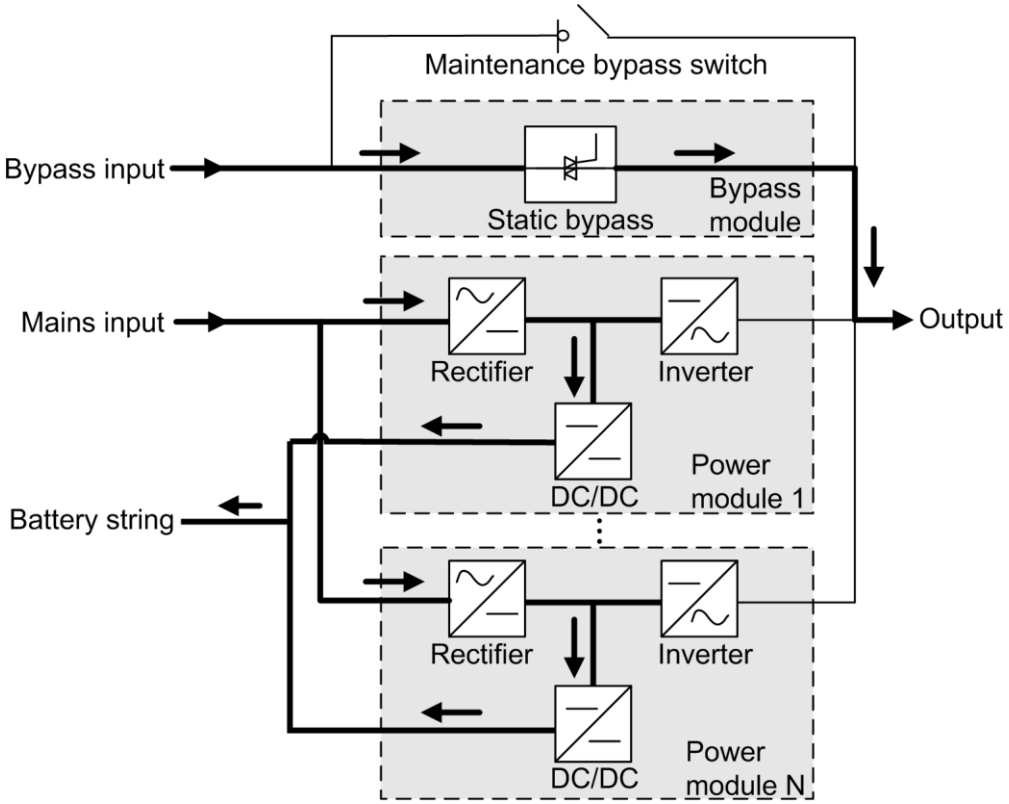
Figure 2-7 UPS conceptual diagram in maintenance bypass mode



2.2.2.6 ECO Mode

The economic control operation (ECO) mode is an economical working mode, which can be configured on the LCD or web user interface (WebUI). In ECO mode, when the bypass input is within the ECO voltage and frequency ranges and other ECO power supply conditions are met, the UPS works in bypass mode and the inverter is in standby state. When the bypass voltage is outside the ECO voltage range, the UPS transfers from bypass mode to normal mode. In bypass mode or normal mode, the rectifier keeps working and charges batteries using a charger. The ECO mode delivers a high efficiency.

Figure 2-8 UPS conceptual diagram in ECO mode



NOTE

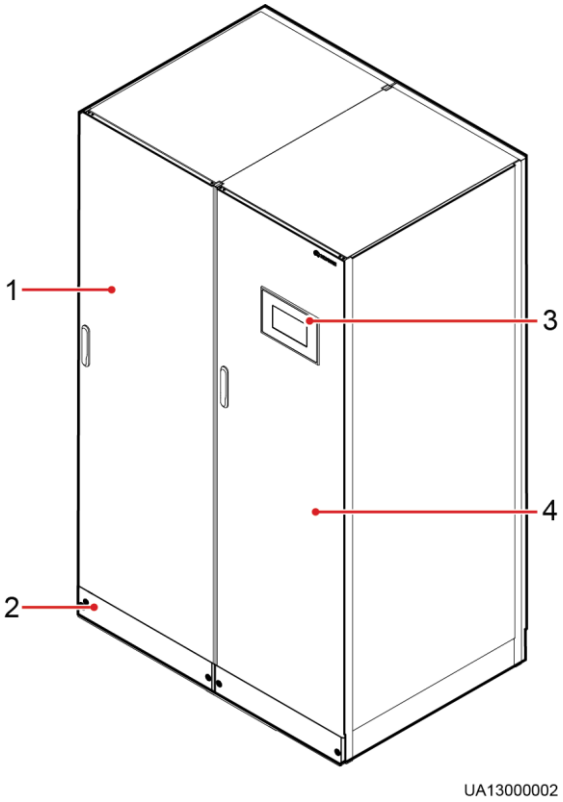
Manual startup is required to ensure that the inverter is in standby state and the power flow has reached the inverter.

2.3 Product Introduction

2.3.1 Appearance

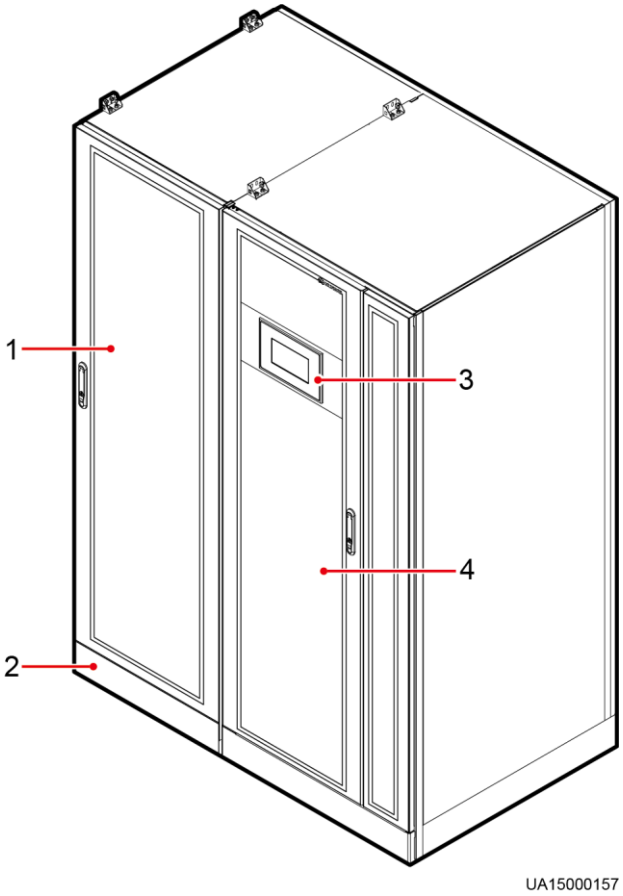
Figure 2-9 to Figure 2-11 show the 400 kVA, 500 kVA, 600 kVA, and 880 kVA UPSs.

Figure 2-9 400 kVA/500 kVA UPS



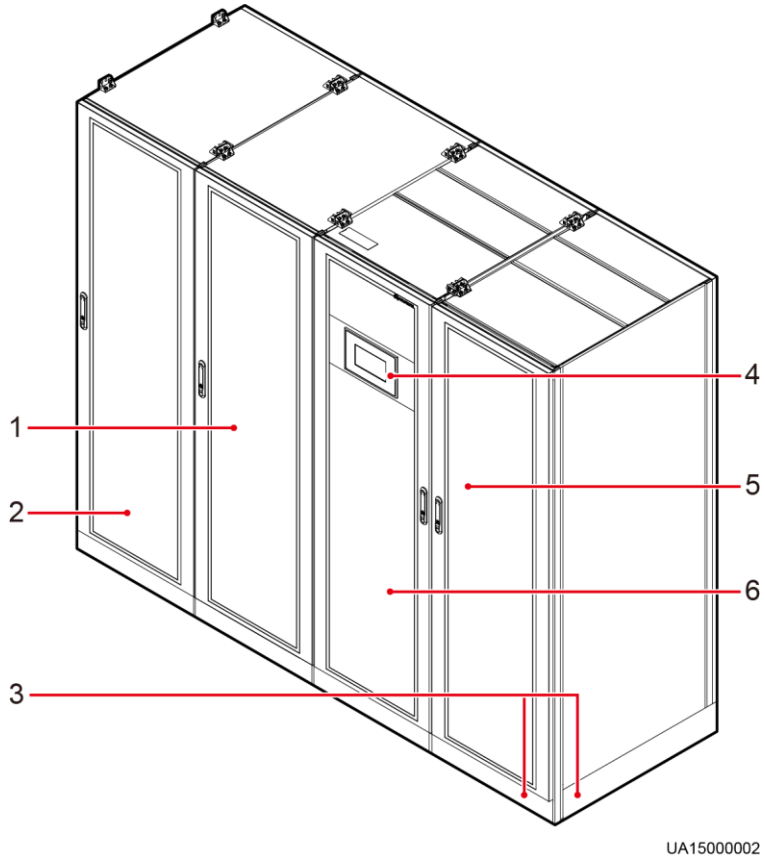
(1) Power cabinet	(2) Anchor baffle plates	(3) Monitor display unit (MDU)	(4) Bypass cabinet

Figure 2-10 600 kVA UPS



(1) Power cabinet (2) Anchor baffle plates (3) MDU (4) Bypass cabinet

Figure 2-11 880 kVA UPS



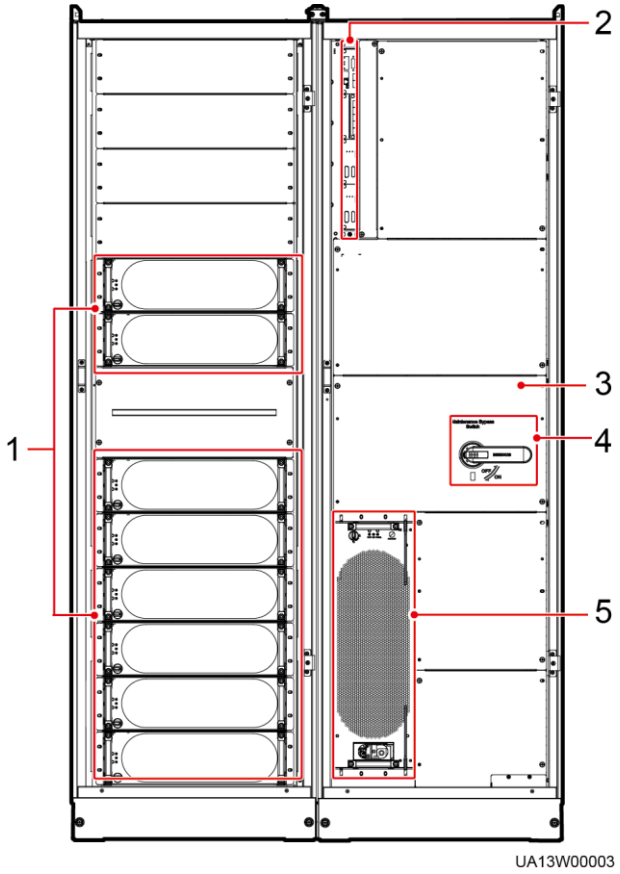
(1) Power cabinet 1 (2) Power cabinet 2 (3) Anchor baffle plates

(4) MDU (5) Bypass cabinet 2 (6) Bypass cabinet 1

2.3.2 Product Structure

Figure 2-12 to Figure 2-19 show the structures of UPSs with the front doors open.

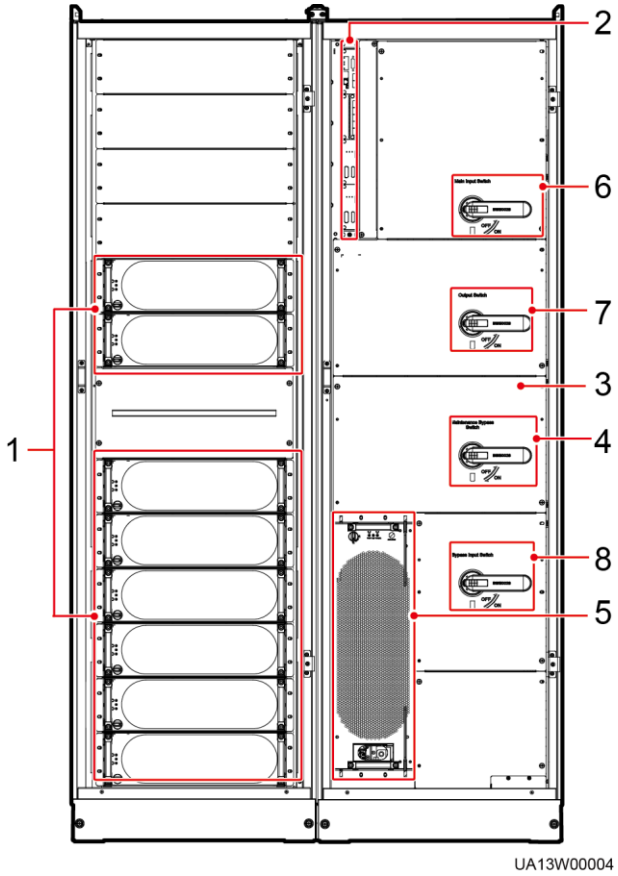
Figure 2-12 Product structure (400 kVA in standard configuration)



(1) Power modules (2) Control module (3) Power distribution module cover

(4) Maintenance bypass switch (5) Bypass module

Figure 2-13 Product structure (400 kVA in full configuration)



(1) Power modules

(2) Control module

(3) Power distribution module cover

(4) Maintenance bypass switch

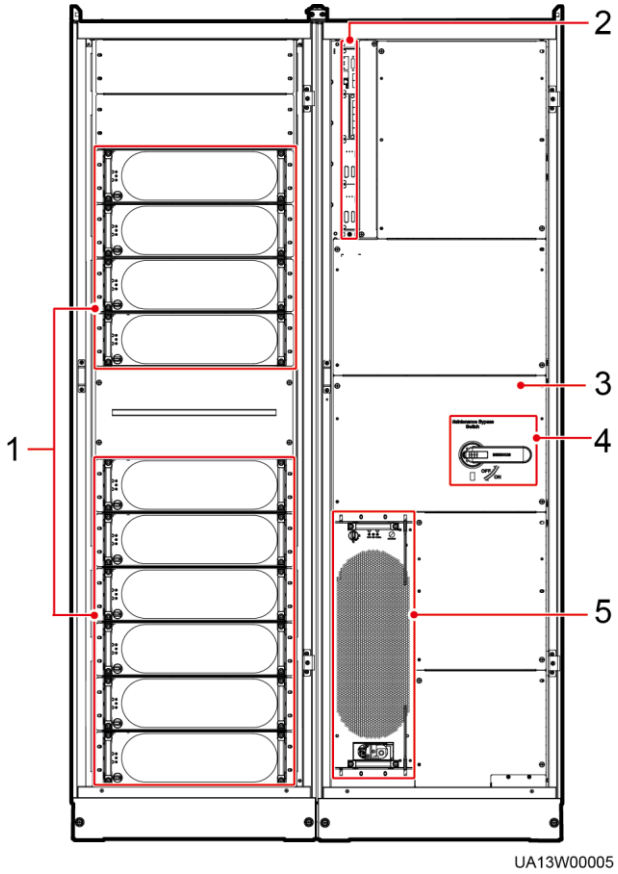
(5) Bypass module

(6) Mains input switch

(7) Output switch

(8) Bypass input switch

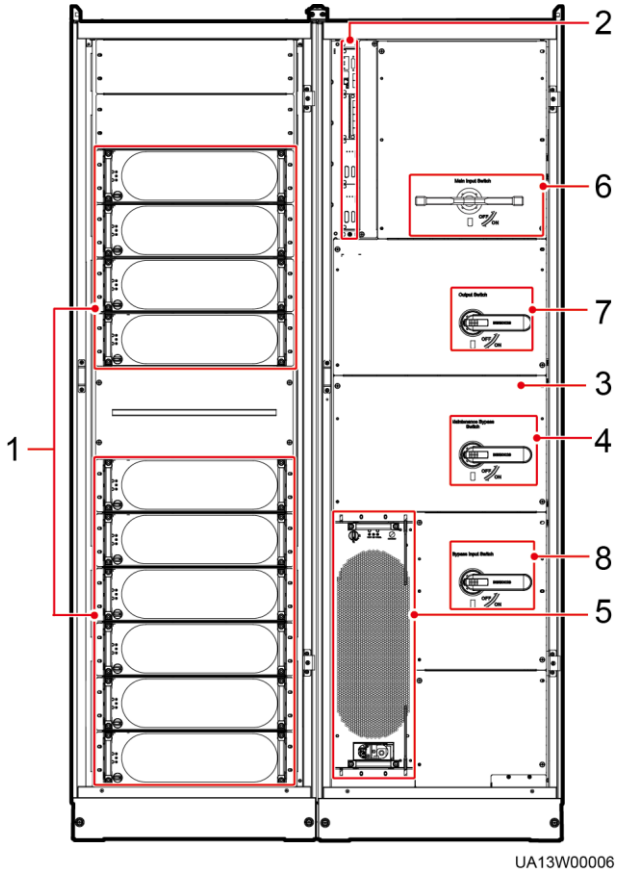
Figure 2-14 Product structure (500 kVA in standard configuration)



(1) Power modules (2) Control module (3) Power distribution module cover

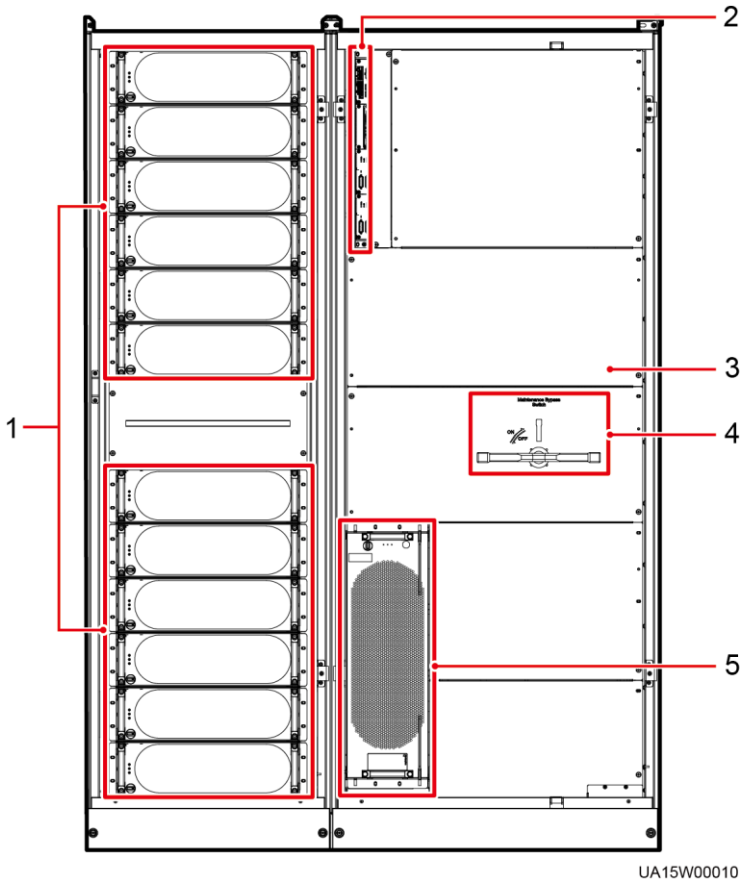
(4) Maintenance bypass switch (5) Bypass module

Figure 2-15 Product structure (500 kVA in full configuration)



(1) Power modules
(2) Control module
(3) Power distribution module cover
(4) Maintenance bypass switch
(5) Bypass module
(6) Mains input switch
(7) Output switch
(8) Bypass input switch

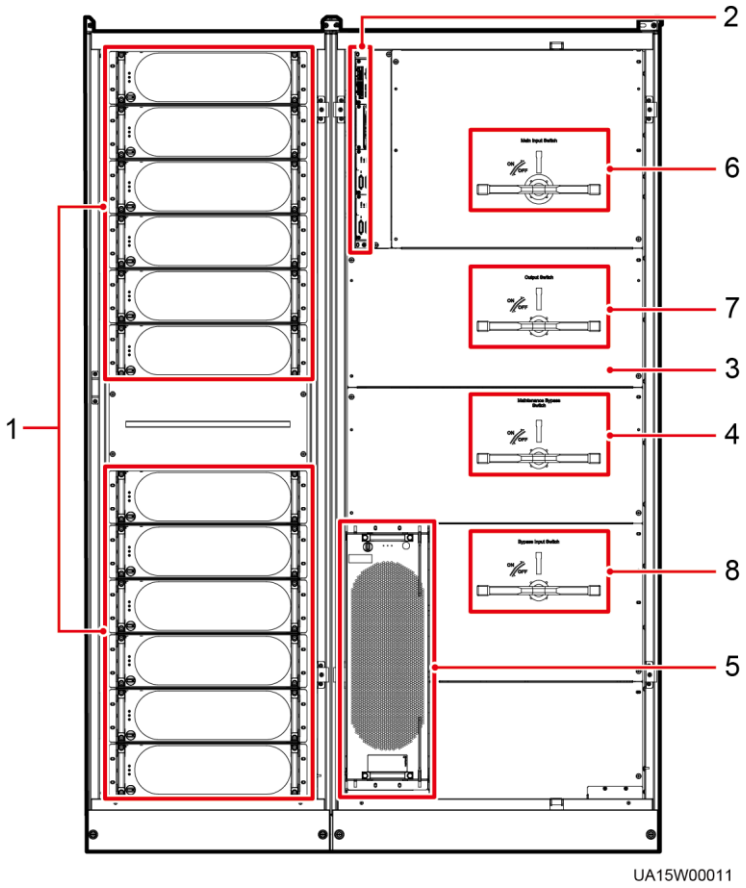
Figure 2-16 Product structure (600 kVA in standard configuration)



(1) Power modules (2) Control module (3) Power distribution module cover

(4) Maintenance bypass switch (5) Bypass module

Figure 2-17 Product structure (600 kVA in full configuration)



(1) Power modules

(2) Control module

(3) Power distribution module cover

(4) Maintenance bypass switch

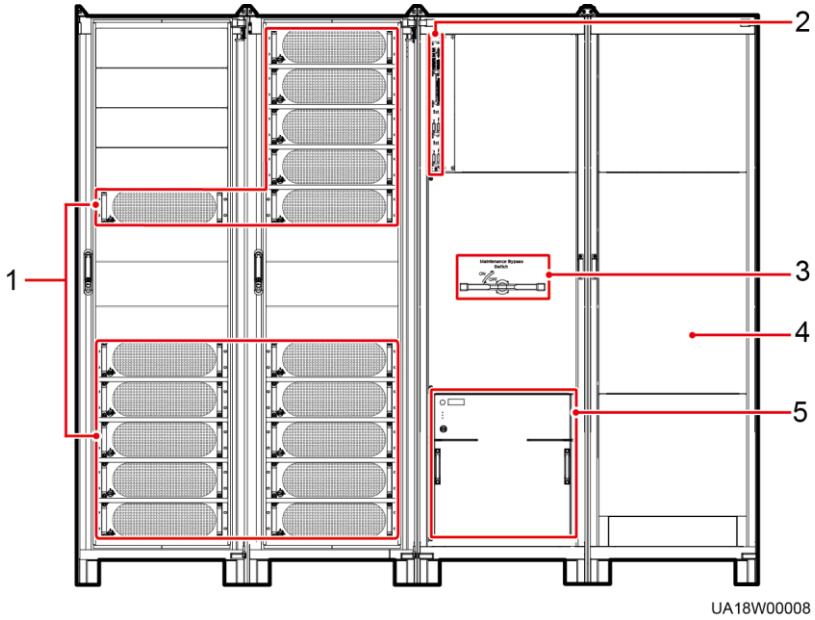
(5) Bypass module

(6) Mains input switch

(7) Output switch

(8) Bypass input switch

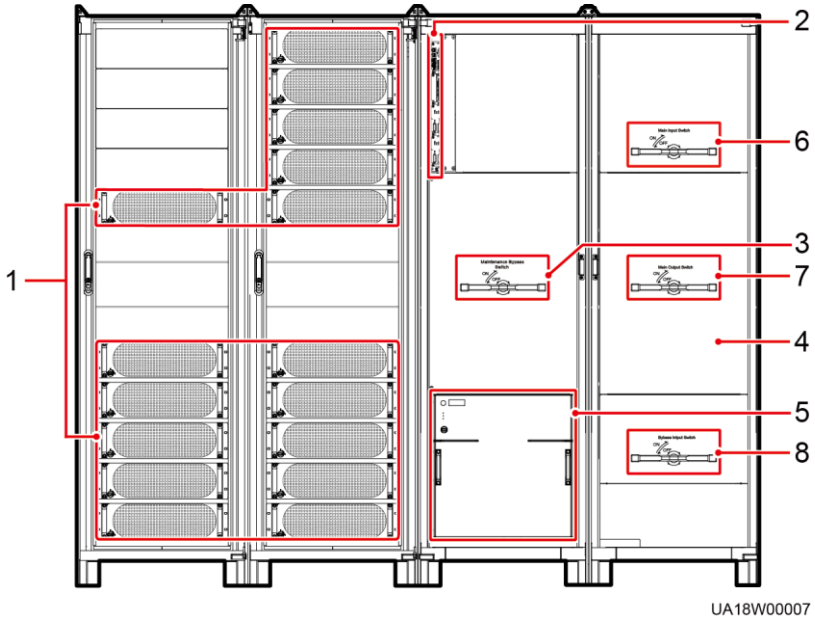
Figure 2-18 Product structure (880 kVA in standard configuration)



(1) Power modules (2) Control module (3) Maintenance bypass switch

(4) Power distribution module cover (5) Bypass module

Figure 2-19 Product structure (880 kVA in full configuration)



(1) Power modules (2) Control module (3) Maintenance bypass switch

(4) Power distribution module cover (5) Bypass module (6) Mains input switch

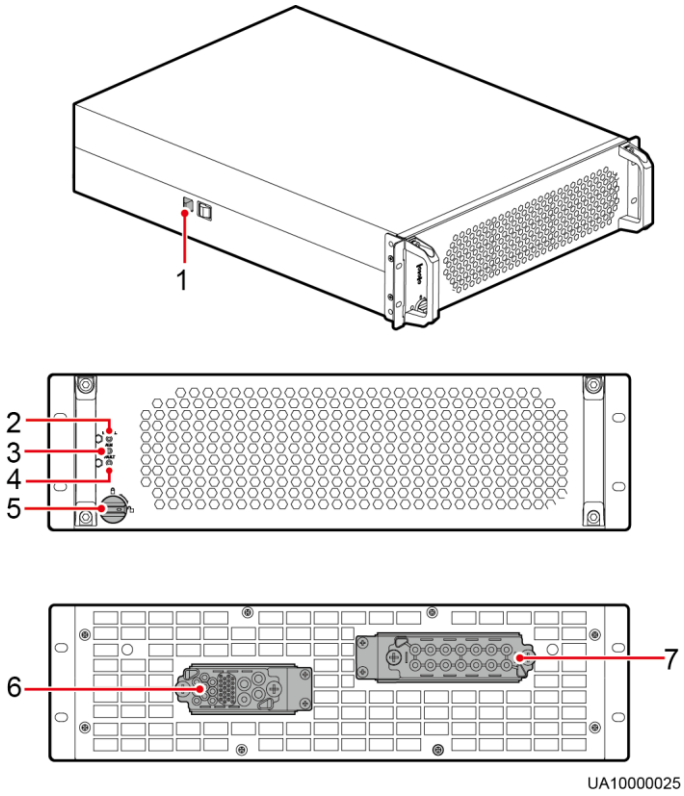
(7) Output switch

(8) Bypass input switch

2.3.3 Power Module

Appearance

Figure 2-20 Power module



(1) Positioning lock (2) Run indicator (3) Alarm indicator (4) Fault indicator

(5) Ready switch (6) Output port (7) Input port

Table 2-2 Indicator description

Indicator	Color	Status	Description
Run indicator	Green	Steady on	The system is working in inverter mode.
		Blinking at long intervals	• The inverter is ready and in standby state (blinking at 0.5 Hz, on for 1s and off for 1s). • The inverter is not started (blinking at 0.2 Hz, on for 2.5s

Indicator	Color	Status	Description
			and off for 2.5s).
		Blinking at short intervals	The module is not configured, the inverter or rectifier DSP software is being upgraded, or the inverter CPLD software is being upgraded (blinking at 4 Hz, on for 0.125s and off for 0.125s).
		Off	The rectifier CPLD software is being upgraded.
Alarm indicator	Yellow	Steady on	A minor alarm is generated for the inverter or rectifier.
		Off	There is no minor alarm for the inverter or rectifier, or the rectifier CPLD software is being upgraded.
Fault indicator	Red	Steady on	A critical alarm is generated for the inverter or rectifier.
		Off	There is no critical alarm for the inverter or rectifier, or the rectifier CPLD software is being upgraded.

Functions

The power module consists of a power factor correction (PFC) rectifier, inverter, and DC/DC converter. The power module performs AC/DC or DC/DC conversion on the mains and battery inputs, and stabilizes the bus voltage. The inverter (DC/AC) converts the inputs into sine wave outputs.

Specifications

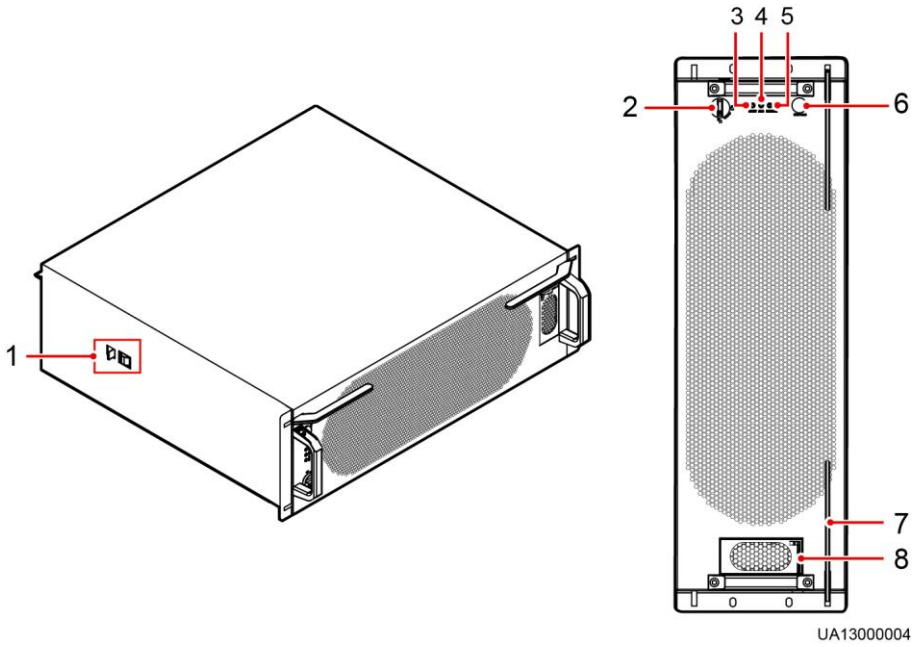
- Dimensions (H x W x D): 130 mm x 442 mm x 620 mm
- Weight: ≤ 35 kg
- Rated output capacity: 55 kVA/55 kW
- Power density: 55 kVA/3 U

2.3.4 Bypass Module

Appearance

400 kVA/500 kVA/600 kVA bypass module have the same appearance. Figure 2-21 shows the 600 kVA bypass module.

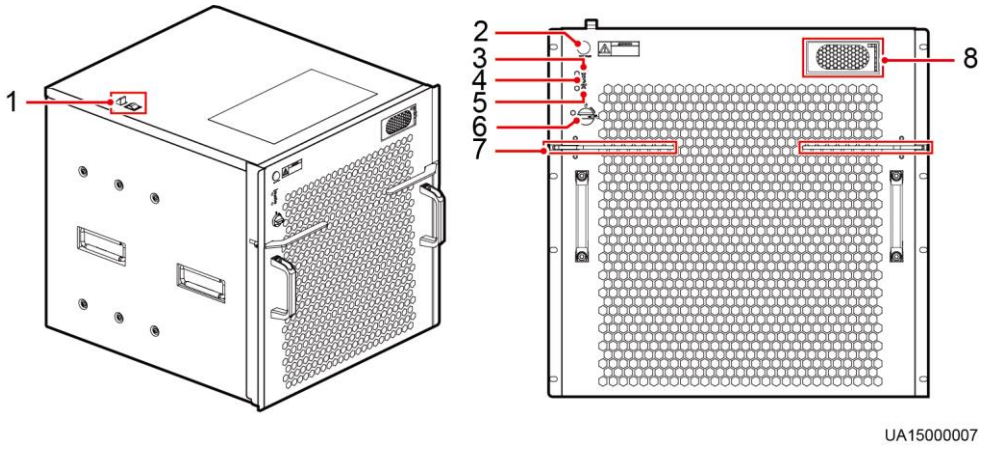
Figure 2-21 600kVA bypass module



(1) Positioning lock	(2) Ready switch	(3) Fault indicator	(4) Alarm indicator
(5) Run indicator	(6) Cold start button	(7) Crowbar	(8) Auxiliary power supply

Figure 2-22 shows the 880 kVA bypass module.

Figure 2-22 880kVA bypass module



(1) Positioning lock	(2) Cold start button	(3) Run indicator	(4) Alarm indicator
(5) Fault indicator	(6) Ready switch	(7) Crowbar	(8) Auxiliary power supply

Table 2-3 Indicator description

Indicator	Color	Status	Description
Run indicator	Green	Steady on	The system is working in bypass mode.
		Blinking at long intervals	The bypass has no output (blinking at 0.2 Hz, on for 2.5s and off for 2.5s).
		Blinking at short intervals	The bypass is not configured or the DSP software is being upgraded (blinking at 4 Hz, on for 0.125s and off for 0.125s).
		Off	The bypass CPLD software is being upgraded.
Alarm indicator	Yellow	Steady on	A minor alarm is generated for the bypass.
		Off	There is no minor alarm for the bypass, or the CPLD software is being upgraded.
Fault indicator	Red	Steady on	A critical alarm is generated for the bypass.
		Off	There is no critical alarm for the bypass, or the CPLD software is being upgraded.

Functions

The bypass module supplies power in the following cases:

If the UPS is set to ECO mode and the bypass voltage is within the specified range, the UPS works in bypass mode.

If the power module overload times out, the UPS transfers to bypass mode.

Both the active and standby ECMs are abnormal.

The system fails to run properly and transfers to bypass mode.

A manual operation is performed to transfer to bypass mode.

Specifications

- Dimensions (H x W x D)
  - 400 kVA/500 kVA/600 kVA: 600 mm x 200 mm x 600 mm
  - 880 kVA: 500 mm x 480 mm x 550 mm
- Weight
  - 400 kVA/500 kVA/600 kVA: 50 kg

- 880 kVA: 83 kg

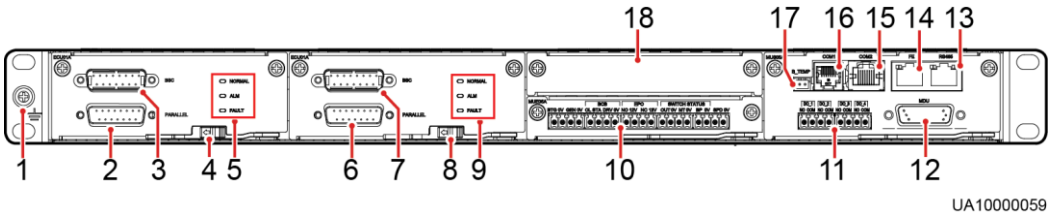
2.3.5 Control Module

2.3.5.1 Overview

In a standard configuration, the control module consists of two ECMs, one dry contact card, and one monitoring interface card (from left to right). The four cards are hot swappable. One subrack is reserved above the dry contact card. A backfeed protection card or dry contact extended card can be inserted into this subrack.

Figure 2-23 shows the signal panel on the control module.

Figure 2-23 Signal panel on the control module



(1) Ground terminal	(2) Parallel port 1	(3) BSC port 1	(4) Ready switch on ECM 1
(5) Indicators for ECM 1	(6) Parallel port 2	(7) BSC port 2	(8) Ready switch on ECM 2
(9) Indicators for ECM 2	(10) Dry contact card	(11) Dry contacts	(12) MDU port
(13) RS485 port	(14) Fast Ethernet (FE) port	(15) COM2 port	(16) COM1 port
(17) Battery temperature sensor port	(18) Optional card subrack cover		

NOTE
Ports are protected by a security mechanism.

2.3.5.2 ECM

Appearance

The control module consists of two energy control modules (ECMs) in active/standby mode.

Figure 2-24 ECM

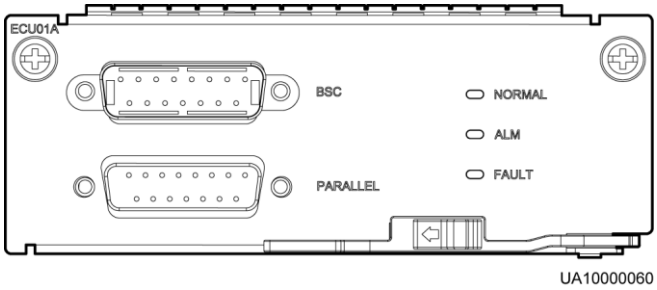


Table 2-4 Ports on the ECM

Silk Screen	Description
PARALLEL	The PARALLEL port transmits parallel signals between racks.
BSC	The BSC port is used in a dual-bus system to synchronize output frequencies and phases between UPS systems, ensuring that two buses can switch with each other. BSC cables are hot-swappable.

NOTE
For a single UPS, the parallel cable is not needed.

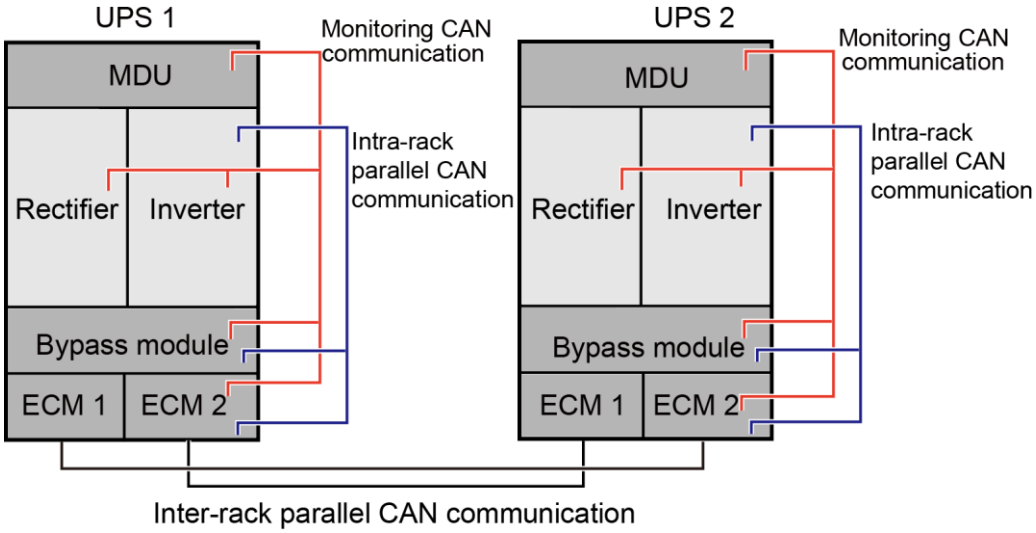
Table 2-5 Indicator description

Indicator	Color	Status	Description
NORMAL	Green	Steady on	This ECM is the active ECM.
		Blinking at 0.5 Hz	This ECM is the standby ECM and it is ready.
		Off	This ECM is not ready or the CPLD of this ECM is being upgraded.
		Blinking at 4 Hz	The DSP of the ECM is being upgraded or not configured.
ALM	Yellow	Steady on	The ECM has a minor alarm, but it does not need to be replaced.
		Off	The ECM has no minor alarm or the DSP of the ECM is being upgraded.
FAULT	Red	Steady on	The ECM has a critical alarm.
		Off	The ECM has no critical alarm or the DSP of the ECM is being upgraded.

Functions

- As a control interface for the entire system, the ECM communicates with each module and provides a bus to communicate with the dry contact card. The ECM ensures equalized output currents between modules so that load power is equally shared.
- Provides module running information for the MDU.
- Controls the running of a single UPS5000 and a parallel system, and reports the UPS5000 status information to other monitoring modules.
- The system provides three types of CAN communication: monitoring CAN communication, intra-rack parallel CAN communication, and inter-rack parallel CAN communication.

Figure 2-25 Logical connections for CAN communication



Specifications

- Hot-swappable
- 1 U high

2.3.5.3 Dry contact card

Appearance

Figure 2-26 Dry contact card

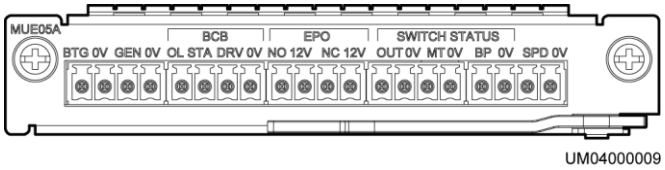


Table 2-6 Ports on the dry contact card

Silk Screen	Description	Status	Initial Status
BTG	Port for detecting battery grounding faults	• Connected: battery grounding fault • Disconnected: no battery grounding fault	Disconnected
0V	Port for signal ground		
GEN	Port for detecting diesel generator (D.G.) mode	• Connected: D.G. mode • Disconnected: non-D.G. mode	Disconnected
0V	Port for signal ground		
BCB_OL	Port for detecting the BCB box	• Grounded: BCB box connected • Disconnected: BCB box not connected	Grounded
BCB_STA	Port for monitoring the battery switch	• Connected: battery switch ON • Disconnected: battery switch OFF	Disconnected
BCB_DRV	Controls battery circuit breaker trip. When the voltage is +12 V, the circuit breaker trips.	• 0 V: battery switch not tripped • 12 V: battery switch tripped	0 V
BCB_0V	Port for signal ground		
EPO_NO	Emergency power-off (EPO) port	If the normally open (NO) port is connected to the EPO_12V port, EPO is triggered.	Disconnected
EPO_12V	+12 V		
EPO_NC	EPO port	If the normally closed (NC) port is disconnected from the EPO_12V port, EPO is triggered.	Connected
EPO_12V	+12 V		
SWITCH STATUS_OUT	Port for monitoring the UPS output circuit breaker	• Connected: circuit breaker ON • Disconnected: circuit breaker OFF	Connected
SWITCH STATUS_0V	Port for signal ground		
SWITCH STATUS_	Port for monitoring the maintenance circuit breaker	• Disconnected: circuit breaker ON	Disconnected

Silk Screen	Description	Status	Initial Status
MT		• Connected: circuit breaker OFF	
SWITCH STATUS_ 0V	Port for signal ground		
SWITCH STATUS_ BP	Port for monitoring the bypass input circuit breaker	• Connected: circuit breaker ON • Disconnected: circuit breaker OFF	Connected
SWITCH STATUS_ 0V	Port for signal ground		
SPD	Port for monitoring the input AC surge protective device (SPD)	• Connected: SPD enabled • Disconnected: SPD disabled	Connected
0V	Port for signal ground		

NOTE

- The dry contact interface card takes effect only after it is set on the monitoring system. Set the unused dry contact signal to the unused status.
- Set the EPO port to NO or NC as required.
- When multiple UPSs are paralleled, all dry contact signals to be used need to connect to each UPS.
- Single cables require dual-insulated twisted cables. If the length of a power cable is within 25–50 m, its cross-sectional area must be 0.5 mm^2 to 1.5 mm^2.

Functions

The dry contact card allows the UPS to detect and manage the switch status of the battery system (including the external battery switch) and implement remote emergency power-off (EPO).

Specifications

- Hot-swappable
- 0.5 U high

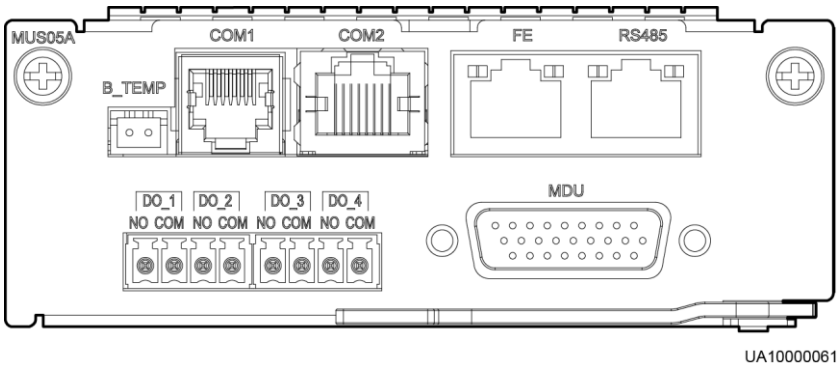
2.3.5.4 Monitoring interface card

NOTICE

- The FE port resembles the RS485 port. Follow the silk screen when connecting communications cables as, if the RS485 port is mistaken for the FE port during cable connection, the WebUI cannot be connected. Conversely, if the FE port is mistaken for the RS485 port during cable connection, RS485 communication fails.
- If MDU communication fails, the "Comm. failure" message is displayed on the LCD, screen switching is disabled, the buzzer buzzes, and the fault indicator is red. Once the fault is rectified, the LCD recovers, and the alarm is cleared.
- Dry contact signals take effect after you set them. Disable unused dry contact signals on the monitoring system.
- In a parallel system, ensure that used dry contacts properly connect to each UPS.

The monitoring interface card provides external ports as well as monitoring and control functions for the MDU. The ports include the ambient temperature and humidity sensor port, iBattery port, FE port, battery temperature monitoring port, and network management port. The MDU monitors the UPS, allows users to set parameters, delivers commands, reports information, and displays the UPS key information and parameters on the LCD.

Figure 2-27 Monitoring interface card



NOTE

DO_1 to DO_4 meet the maximum voltage and current requirements of 30 V DC/1 A or 60 V DC/0.5 A.

Table 2-7 Ports on the monitoring interface card

Port	Silk Screen	Description
DO_1	NO	DO_1 is used to output alarms and indicates critical alarms by default. It can be set to indicate minor alarms, bypass mode, battery mode, or low battery voltage.
	COM	
DO_2	NO	DO_2 is used to output alarms and indicates minor alarms by default. It can be set to indicate critical alarms, bypass mode,
	COM	

Port	Silk Screen	Description
		battery mode, or low battery voltage.
DO_3	NO	DO_3 is used to output alarms and indicates bypass mode by default. It can be set to indicate critical alarms, minor alarms, battery mode, or low battery voltage.
	COM	
DO_4	NO	DO_4 is used to output alarms and indicates battery mode by default. It can be set to indicate critical alarms, minor alarms, bypass mode, or low battery voltage.
	COM	
DB26	MDU	Provides FE, RS485, I2C, and CAN signals.
Battery temperature sensor port	B_TEMP	Connects to an indoor battery temperature sensor.
Southbound communications port 1	COM1	Connects to an ambient temperature and humidity sensor over two wires.
Southbound communications port 2	COM2	Connects to a southbound device, such as an iBattery.
Network port	FE	Connects to the network port on a PC.
Northbound communications port	RS485	Connects to a northbound network management device or a third-party network management device over two wires.

NOTE

- Signal cables must be double-insulated twisted cables. If the cable length is 25–50 m, the cross-sectional area must be 0.5–1.5 mm^2.
- RS485 cables and FE cables must be shielded cables.

Figure 2-28 and Figure 2-29 are recommended wiring methods for DO ports.

Figure 2-28 Wiring method 1

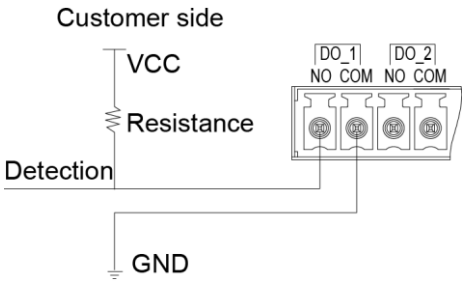


Figure 2-29 Wiring method 2

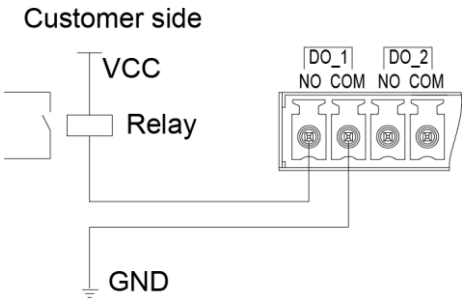


Figure 2-30 COM1 pins

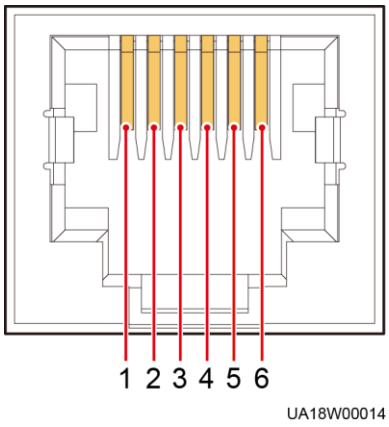


Table 2-8 COM1 pin definition

Pin	Description
1	GND
2	N/A
3	RS485–
4	RS485+

Pin	Description
5	N/A
6	12V_PORT

Figure 2-31 COM2 pins

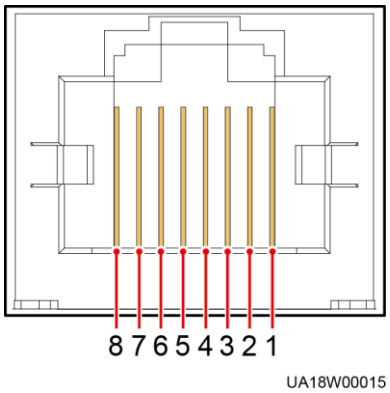


Table 2-9 COM2 pin definition

Pin	Description
1	RS485+
2	RS485–
3	N/A
4	RS485+
5	RS485–
6	GND
7	CANH0
8	CANL0

Figure 2-32 RS485 pins

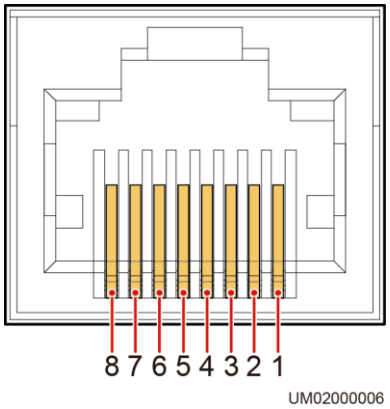


Table 2-10 RS485 pin definition

Pin	Description
1	RS485_T+
2	RS485_T–
3	N/A
4	RS485_R+
5	RS485_R–
6	GND
7	N/A
8	N/A

NOTE

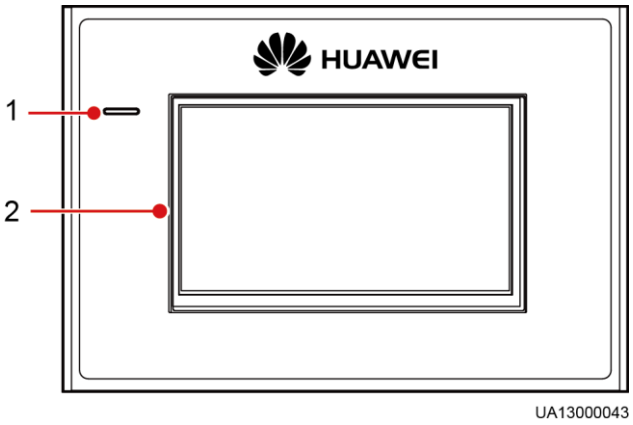
If cables are prepared onsite, follow the three methods below:

- Connect pin 1 and pin 2. Pin 1 connects to RS485+ and pin 2 connects to RS485–.
- Connect pin 4 and pin 5. Pin 4 connects to RS485+ and pin 5 connects to RS485–.
- Connect pins 1, 2, 4, and 5. Twist cables to pin 1 and pin 4 into one cable and then connect it to RS485+. Twist cables to pin 2 and pin 5 into one cable and then connect it to RS485–.

2.3.6 MDU

Appearance

Figure 2-33 MDU



(1) Status indicator (2) LCD touchscreen

NOTE

Touch the LCD screen firmly because it is an industrial resistive touchscreen. It is recommended that you use your fingernails for accurate selection and quick response.

Figure 2-34 Touching the LCD

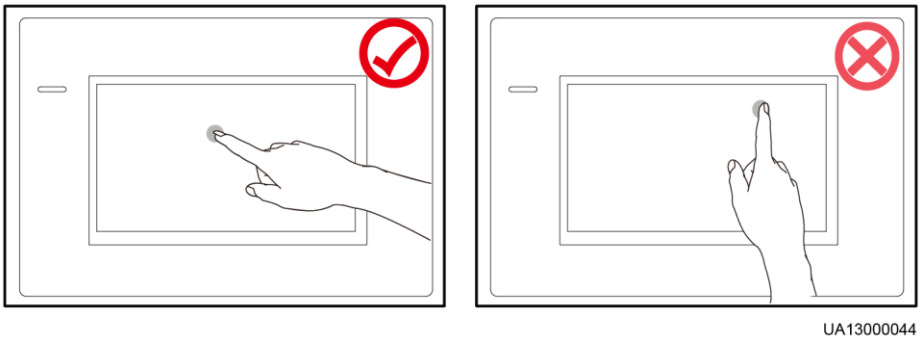


Table 2-11 Status indicator

Status	Color	Meaning
On	Red	A critical alarm has been generated, and the buzzer sounds continuously.
	Yellow	A minor alarm has been generated, and the buzzer buzzes at 2 Hz.

Status	Color	Meaning
	Green	The UPS is running properly or a warning has been generated.
Off	N/A	The MDU is powered off.

NOTE
The indicator on the LCD panel is yellow when the bypass supplies power in non-ECO mode.

The ports of the LCD screen are located at the side of the LCD screen.

Figure 2-35 LCD screen ports

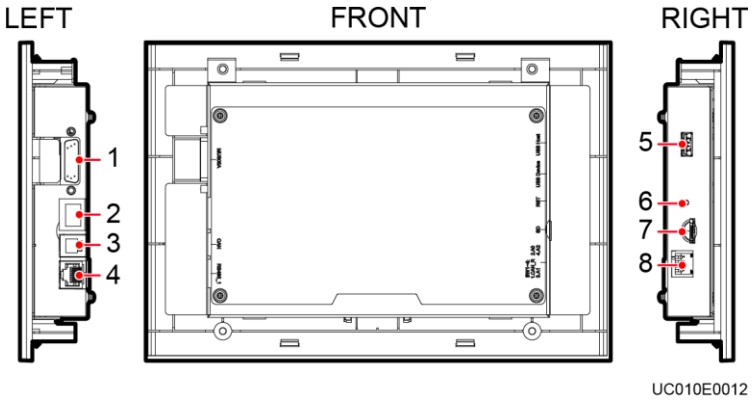


Table 2-12 Description of LCD screen ports

No.	Port Name	Description
1	MUS05A (DB26)	Connects to the MDU and monitoring interface card
2	FE	Network port for connecting to the web service and for SNMP networking
3	CAN	Reserved
4	RS485_1	Reserved
5	USB Host	Connects to a USB flash drive, used for upgrading the LCD online and upgrading configurations
6	RST	Restart switch for the MDU
7	SD	Reserved
8	DIP switch	Implements specific functions by using the DIP switch and specific buttons; controls the CAN

No.	Port Name	Description
		communication build-out resistor in a parallel system

Functions

The monitor display unit (MDU) allows for general UPS operations, parameter setting, viewing of running status and alarms, and so on.

Specifications

Dimensions (H x W x D): 175 mm x 264 mm x 40 mm

2.4 Typical configurations

Table 2-13 Typical UPS configurations

Configuration	Application Scenario
Single UPS	Supplies power to common loads.
Parallel system	Supplies power to important loads in small- and medium-sized data centers. It features high availability and strong transient overload capability.
Dual-bus system	The dual-bus system is suitable for scenarios where high availability requirements are posed for power supply. The dual-bus system supplies power to important loads in large- and medium-sized equipment rooms and data centers. In addition to common parallel system advantages, the dual-bus system also provides outstanding availability and eliminates bottleneck failures. However, configuration of the dual-bus system is complex.

NOTE
A 1+1 parallel system is a typical configuration. You can set the number of requisite UPSs and redundant ones on the LCD or WebUI.

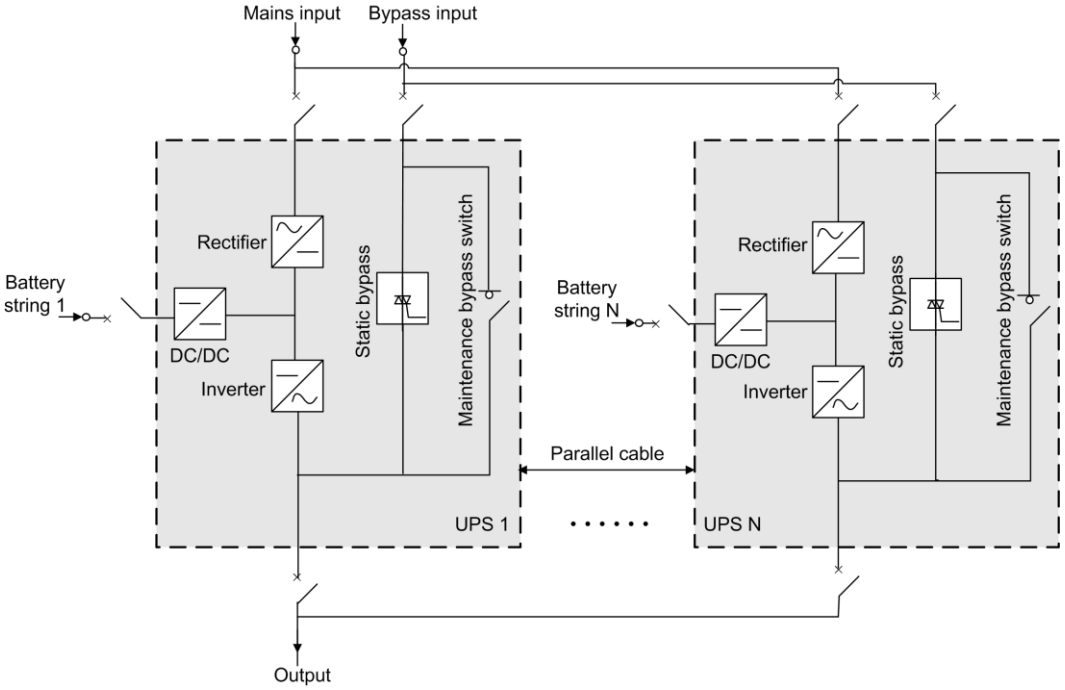
2.4.1 Single UPS

This series uses a modular design in which multiple power modules are connected in parallel to deliver a high loading capacity. If a single power module is faulty, the other power modules continue working. When the load power is small, even a single UPS can provide redundant capacity, which ensures high reliability.

2.4.2 Parallel System

In a parallel system, the mains input, bypass input, and AC output terminals between cabinets are connected in parallel. Energy control modules (ECMs) on each UPS are connected over parallel cables. The parallel connections synchronize the UPS outputs to supply power to loads. If one UPS fails, the other UPSs continue supplying power to loads.

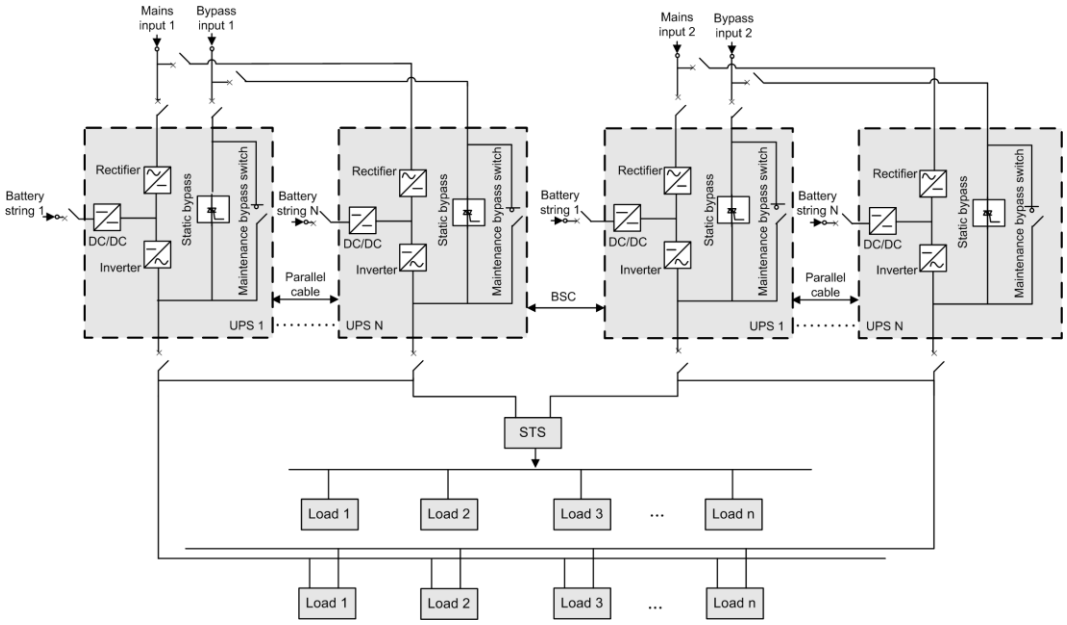
Figure 2-36 Conceptual diagram of an N+X parallel system



2.4.3 Dual-Bus System

A dual-bus system consists of two independent UPS systems. Each of these UPS systems in turn consists of one or more UPSs connected in parallel. Of the two UPS systems, one is a master system, and the other is a slave system. This design makes the dual-bus system highly reliable and suitable for loads with multiple input terminals. An optional static transfer switch (STS) can be installed to start the bus synchronization controller (BSC). The UPS systems work in normal mode or bypass mode.

Figure 2-37 Conceptual diagram of a dual-bus system



2.5 Optional Components

Component	Model		Function
BCB-BOX	400 kVA, 500 kVA, 600 kVA	• PDU8000-0400DCV8-BXA001 • PDU8000-0630DCV8-BXA001 • PDU8000-0800DCV8-BXA001	Controls the connection between battery strings and the UPS, and supports overload, short-circuit protection, and remote trip control.
	880 kVA	• PDU8000-0630DCV8-BXA001 • PDU8000-0800DCV8-BXA001	
BBB-BOX	400 kVA, 500 kVA, 600 kVA	• PDU8000-1250DCV8-BGA001 • PDU8000-2000DCV8-BGA001	Converges the energy of multiple battery strings.
	880 kVA	PDU8000-2000DCV8-BGA001	
Top air-flow cabinet	N/A		Ensures heat dissipation. For details, see the document delivered with the top air-flow cabinet.

Component	Model	Function
iBAT 2.0	N/A	Collects battery information, such as battery status data, from the downstream BIM groups through wireless communication and sends the data to the ECC and the third-party network management system (NMS) through COM or PoE ports. For details, see the document delivered with the iBAT.
Antiseismic kit	N/A	Reinforces the cabinet so that the cabinet meets the requirements of 9 degree seismic fortification intensity.
Air filter	N/A	Prevents the UPS from dust and ensure normal operations.
IP21 component	N/A	Prevents water from dropping into the cabinet, protecting the cabinet to IP21.
ECM extended subrack	N/A	Install this subrack when the UPS is equipped with a backfeed protection card and dry contact extended card.
Dry contact extended card	N/A	Provides extended monitoring ports: five routes of relay output ports and five routes of input ports.
Backfeed protection card	N/A	Detects mains and bypass backfeed and provides protection.
Battery grounding failure detector	N/A	Detects current leakage and generates alarms. When equipped with a remote trip switch, the detector protects devices and prevents fire outbreak. Detects battery grounding failures and generates alarms when the ground leakage current exceeds the specified value.
Parallel cable	5 m/10 m/15 m	Connects UPSs in parallel.
BSC cable	5 m/10 m/15 m/60 m	Transmits bus synchronization signals in a dual-bus system.

NOTE

- If an IP21 component is installed, cables cannot be routed from the top of the cabinet.
- The ECM extended subrack does not support onsite installation. If this component is required, inform Huawei before purchasing the UPS to receive pre-installation services.

3 Installation

3.1 Installation Preparations

3.1.1 Site

3.1.1.1 UPS Dimensions

Figure 3-1 Dimensions (400 kVA/500 kVA, unit: mm)

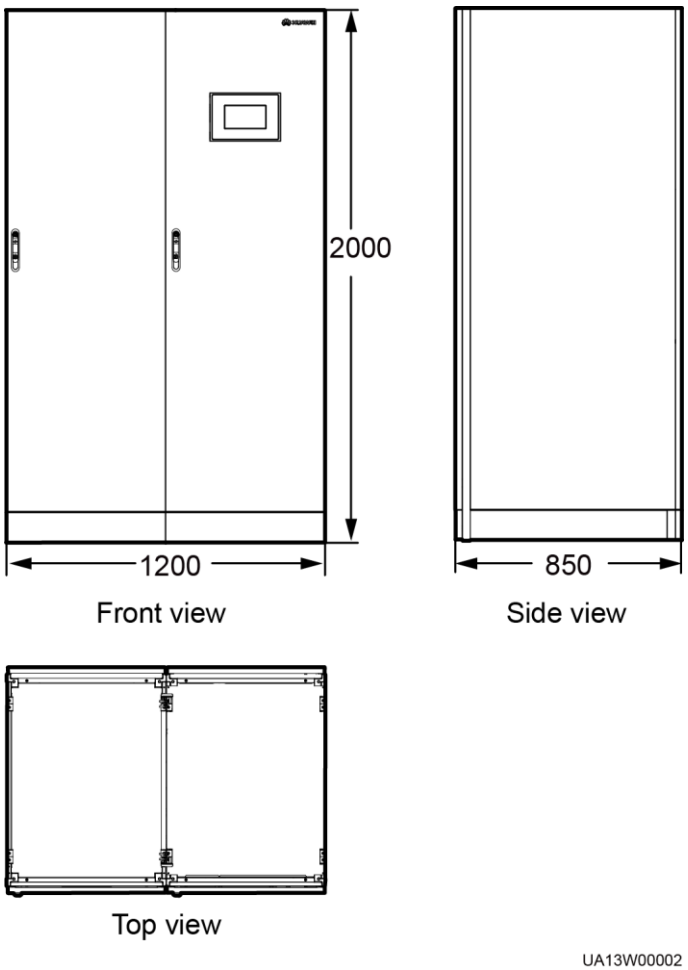


Figure 3-2 Dimensions (600 kVA, unit: mm)

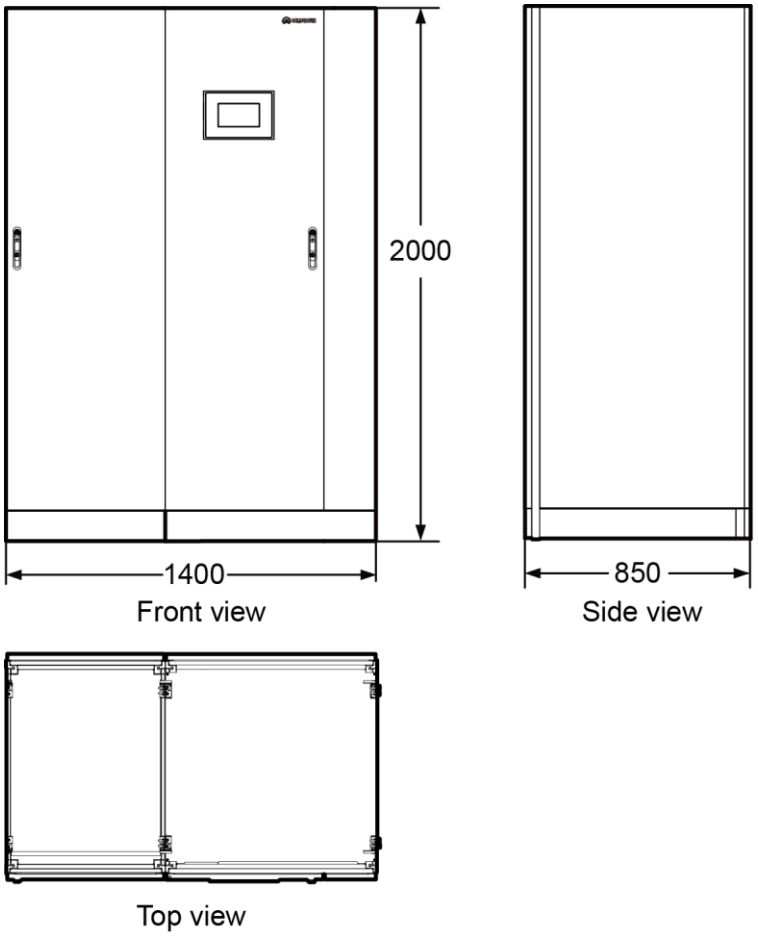
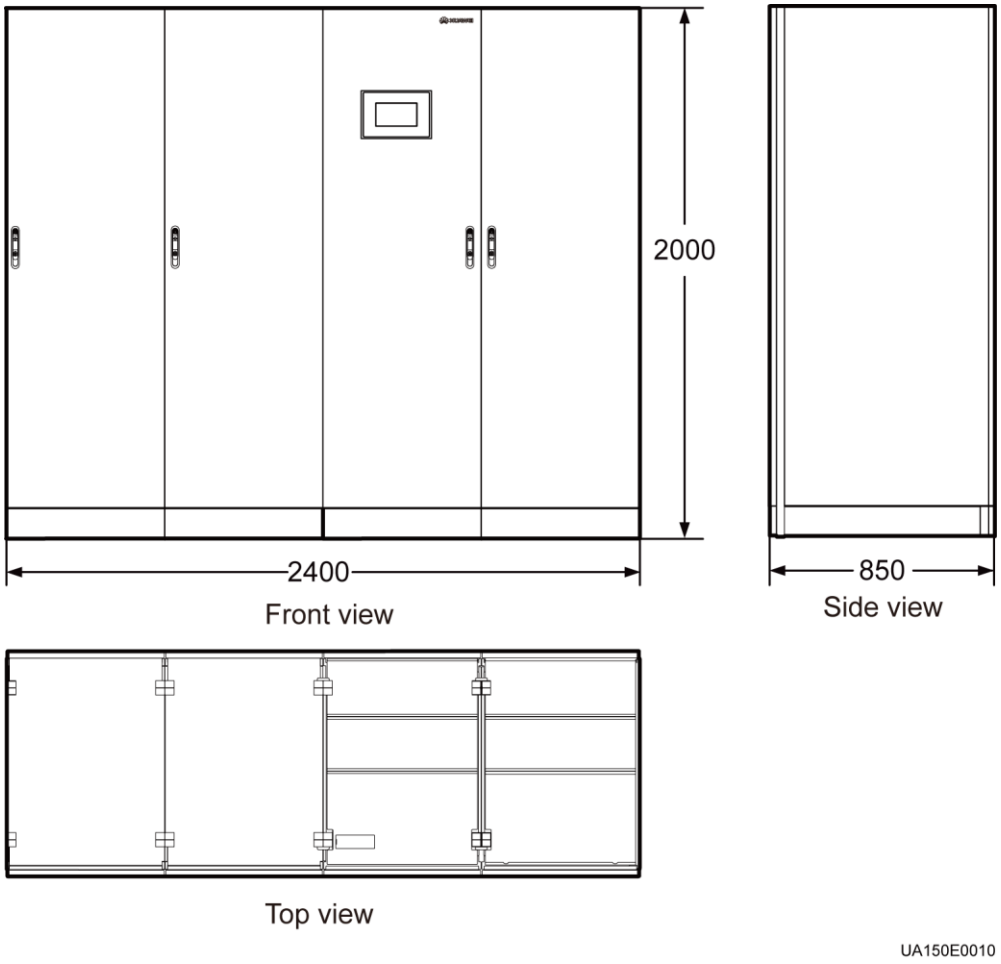


Figure 3-3 Dimensions (880 kVA, unit: mm)



3.1.1.2 Installation Environment

- Do not install the UPS in high temperature, low temperature, or damp environments.
- Install the UPS away from water sources, heat sources, and flammable or explosive materials. Keep the UPS away from direct sunlight, dust, volatile gases, corrosive materials, and air dense with salt particles.
- Do not install the UPS in environments with conductive metal scraps in the air.
- The optimal operating temperatures for valve-regulated lead-acid batteries (VRLA batteries) are 20–30°C. Operating temperatures higher than 30°C shorten the battery lifespan and operating temperatures lower than 20°C reduce the battery backup time.

3.1.1.3 Installation Clearances

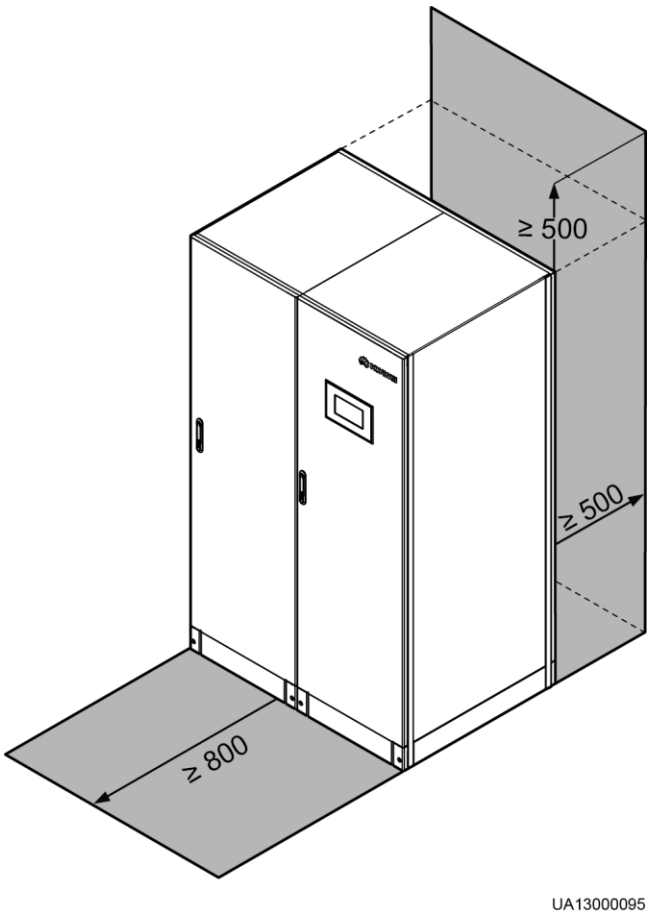
Reserve sufficient clearances around the cabinet to facilitate operations and ventilation:

- Reserve a clearance of at least 800 mm from the front of the cabinet.
- Reserve a clearance of at least 500 mm from the top of the cabinet.
- If a top air-flow cabinet is deployed, the UPS can be installed against a wall and no space needs to be reserved at the rear (except the 880 kVA UPS). If no top air-flow cabinet is

deployed, at least 500 mm space should be reserved at the rear for ventilation. If the UPS will be operated from the rear, at least 800 mm space should be reserved for operations.

Figure 3-4 shows the clearances reserved for a 400 kVA cabinet.

Figure 3-4 Reserved clearances (unit: mm)



3.1.2 Tools and Instruments

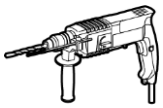
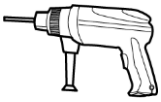
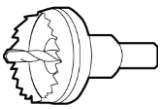
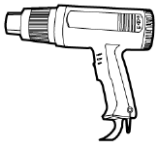
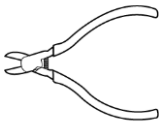
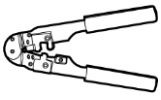
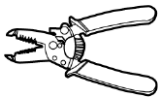
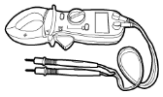
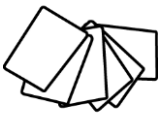
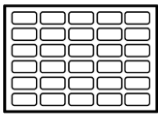
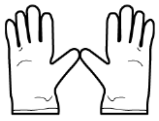
CAUTION

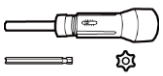
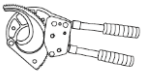
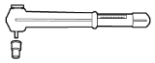
Insulate installation tools to prevent electric shocks.

Prepare the following tools and meters indicated in Table 3-1 for installation.

Table 3-1 Tools and meters

Tools and Meters			
Electric pallet truck	Manual pallet truck	Ladder	Rubber mallet

Tools and Meters			
			
Hammer drill and drill bit Φ16	Hand-held electric drill	Alloy hole saw	Heat gun
			
Diagonal pliers	Crimping tools	Wire stripper	Electric hydraulic pliers
			
Clamp meter	Multimeter	Cable tie	Level instrument
			
Polyvinyl chloride (PVC) insulation tape	Cotton cloth	Label	Electrician's knife
			
Electrostatic discharge (ESD) gloves	Protective gloves	Insulated gloves	Insulation protective shoes
			
Torque screwdriver	Cable cutter	Brush	Flat-head screwdriver (2–5 mm)

Tools and Meters			
			
Phillips screwdriver (M3/M4/M5/M6/M8)	Insulated torque wrench (M6/M8/M12/M16)	Heat shrink tubing	Insulated adjustable wrench
			

NOTE

Table 3-1 lists only the common tools for installation and cable connection. For more dedicated tools required, see the corresponding component manuals. Prepare tools based on site requirements.

3.1.3 Power Cables

NOTICE

- The UPS can generate large leakage currents. A circuit breaker that provides leakage current protection is not recommended.
- If multiple UPSs are to be connected in parallel, input and output power cables for each UPS should have the same length and specifications.
- The TN-C system is supported. If it is adopted, the input N and PE need to be short-circuited.

Table 3-2 and Table 3-3 list the recommended cross-sectional areas for UPS power cables. The currents listed in the tables are measured at a rated voltage of 380 V.

Table 3-2 Recommended power cable cross-sectional area (350 kVA–550 kVA UPS)

Item			350 kVA	400 kVA	450 kVA	500 kVA	550 kVA
Mains input connector	Mains input current (A)		616	704	792	880	968
	Recommended cross-sectional area (mm^2)	L1	2 x (4 x 185)	2 x (4 x 240)	3 x (4 x 185)	3 x (4 x 185)	3 x (4 x 240)
		L2					
		L3					
		N					
		PE	185	240	240	240	240

Item			350 kVA	400 kVA	450 kVA	500 kVA	550 kVA
Bypass input connector	Bypass input current (A)		532	608	684	760	836
	Recommended cross-sectional area (mm^2)	L1	2 x (4 x 185)	2 x (4 x 240)	3 x (4 x 185)	3 x (4 x 185)	3 x (4 x 240)
		L2					
		L3					
		N					
		PE	185	240	240	240	240
Output connector	Output current (A)		532	608	684	760	836
	Recommended cross-sectional area (mm^2)	U	2 x (4 x 185)	2 x (4 x 240)	3 x (4 x 185)	3 x (4 x 185)	3 x (4 x 240)
		V					
		W					
		N					
		PE	185	240	240	240	240
Battery input connector	Nominal battery discharge current (A)		768	877	987	1096	1206
	Maximum battery discharge current (A)		919	1051	1182	1313	1444
	Recommended cross-sectional area (mm^2)	+	2 x (2 x 185)	2 x (2 x 185)	3 x (2 x 150)	3 x (2 x 150)	3 x (2 x 240)
		-					
		PE	185	185	240	240	240

Table 3-3 Recommended power cable cross-sectional area (600 kVA–880 kVA UPS)

Item			600 kVA	650 kVA	700 kVA	750 kVA	880 kVA
Mains input connector	Mains input current (A)		1056	1144	1232	1320	1408
	Recommended cross-sectional area (mm^2)	L1	4 x (4 x 185)	4 x (4 x 240)	4 x (4 x 240)	4 x (4 x 240)	4 x (4 x 240)
		L2					
		L3					
		N					
		PE	240	240	240	240	240

Item			600 kVA	650 kVA	700 kVA	750 kVA	880 kVA
Bypass input connector	Bypass input current (A)		912	988	1064	1140	1215
	Recommended cross-sectional area (mm^2)	L1	4 x (4 x 185)	4 x (4 x 240)	4 x (4 x 240)	4 x (4 x 240)	4 x (4 x 240)
		L2					
		L3					
		N					
		PE	240	240	240	240	240
Output connector	Output current (A)		912	988	1064	1140	1215
	Recommended cross-sectional area (mm^2)	U	4 x (4 x 185)	4 x (4 x 240)	4 x (4 x 240)	4 x (4 x 240)	4 x (4 x 240)
		V					
		W					
		N					
		PE	240	240	240	240	240
Battery input connector	Nominal battery discharge current (A)		1316	1425	1535	1645	1754
	Maximum battery discharge current (A)		1576	1707	1838	1970	2101
	Recommended cross-sectional area (mm^2)	+	3 x (2 x 240)	3 x (2 x 240)	4 x (2 x 240)	4 x (2 x 240)	4 x (2 x 240)
		-					
		PE	240	240	240	240	240

- When selecting, connecting, and routing power cables, follow local safety regulations and rules.
- If external conditions such as cable layout or ambient temperatures change, perform verification in accordance with the IEC-60364-5-52 or local regulations.
- If the rated voltage is 400 V, multiply the currents by 0.95. If the rated voltage is 415 V, multiply the currents by 0.92.
- If primary loads are non-linear loads, increase the cross-sectional areas of neutral wires 1.5–1.7 times.
- The nominal battery discharge current refers to the current of forty 12 V batteries at 480 V in standard configuration.
- The maximum battery discharge current refers to the current when forty 12 V batteries in standard configuration, that is, two hundred and forty 2 V battery cells (1.67 V/cell), stop discharging.

- The battery cable specifications are selected based on 40 batteries by default and compatible with application scenarios with 30–50 batteries.
- When the mains input and bypass input share a power source, configure mains input power cables as input power cables. In addition, cables listed in Table 3-2 and Table 3-3 apply only to the following conditions:
  - Routing mode: Routing the cables over the cable ladder or bracket in a single layer (IEC60364-5-52 middle E). The distances between cables must be greater than twice the cable diameter.
  - The ambient temperature is 30°C.
  - The AC voltage loss is less than 3%, and the DC voltage loss is less than 1%.
  - 90°C copper flexible cable.
  - The length of the AC power cables of a UPS is no longer than 30 m and DC power cables no longer than 50 m.

NOTICE

When you connect power cables, comply with the tightening torque listed in Table 3-4 to ensure secure connections and prevent safety risks.

Table 3-4 Power cable connector requirements

Connector	Connection Mode	Bolt Type	Bolt Hole Diameter	Bolt Length	Torque
Mains input connector	Crimped DT terminals	M16	18 mm	50 mm	120 N·m
Bypass input connector	Crimped DT terminals	M16	18 mm	50 mm	120 N·m
Battery input connector	Crimped DT terminals	M16	18 mm	50 mm	120 N·m
Output connector	Crimped DT terminals	M16	18 mm	50 mm	120 N·m
Grounding connector	Crimped DT terminals	M12	N/A	35 mm	47 N·m

Table 3-5 Recommended upstream input and downstream output circuit breakers

UPS Capacity	Component	Specifications[a]
350 kVA	Mains input circuit breaker	800 A/3P
	Bypass input circuit breaker	630 A/3P

UPS Capacity	Component	Specifications[a]
	Output branch circuit breaker	630 A/3P
400 kVA	Mains input circuit breaker	800 A/3P
	Bypass input circuit breaker	630 A/3P
	Output branch circuit breaker	630 A/3P
450 kVA	Mains input circuit breaker	1000 A/3P
	Bypass input circuit breaker	800 A/3P
	Output branch circuit breaker	800 A/3P
500 kVA	Mains input circuit breaker	1000 A/3P
	Bypass input circuit breaker	800 A/3P
	Output branch circuit breaker	800 A/3P
550 kVA	Mains input circuit breaker	1250 A/3P
	Bypass input circuit breaker	1000 A/3P
	Output branch circuit breaker	1000 A/3P
600 kVA	Mains input circuit breaker	1250 A/3P
	Bypass input circuit breaker	1000 A/3P
	Output branch circuit breaker	1000 A/3P
650 kVA	Mains input circuit breaker	1600 A/3P
	Bypass input circuit breaker	1000 A/3P
	Output branch circuit breaker	1000 A/3P
700 kVA	Mains input circuit breaker	1600 A/3P
	Bypass input circuit breaker	1250 A/3P
	Output branch circuit breaker	1250 A/3P
750 kVA	Mains input circuit breaker	1600 A/3P
	Bypass input circuit breaker	1250 A/3P
	Output branch circuit breaker	1250 A/3P

UPS Capacity	Component	Specifications[a]
880 kVA	Mains input circuit breaker	1600 A/3P
	Bypass input circuit breaker	1250 A/3P
	Output branch circuit breaker	1250 A/3P
a: Circuit breakers configured for the 400 kVA UPS are used in circuits with a short-circuit current of less than 35 kA, and those for the 500/600/880 kVA UPS are used in circuits with a short-circuit current of less than 50 kA.		

NOTE

- The input upstream circuit breakers recommended in Table 3-5 are for reference only.
- If multiple loads are connected, specifications for branch circuit breakers must not exceed the recommended specifications.
- The circuit breaker selection principle is to protect loads and cables, and the cascading principle is to realize specific protection.

3.1.4 Unpacking

Context

NOTICE

- Only trained personnel are allowed to move the UPS. Use a pallet truck to transport the UPS box secured to a wooden support to the installation position.
- To prevent the UPS from falling over, secure it to an electric pallet truck using ropes before moving it.
- To prevent shocks or falls, move the UPS gently. After placing the UPS in the installation position, unpack it with care to prevent scratches. Keep the UPS steady during unpacking.
- If the UPS installation environment is in poor condition and the UPS will be stored for a long time after it is unpacked, wrap the UPS with the original plastic coat to prevent dust.

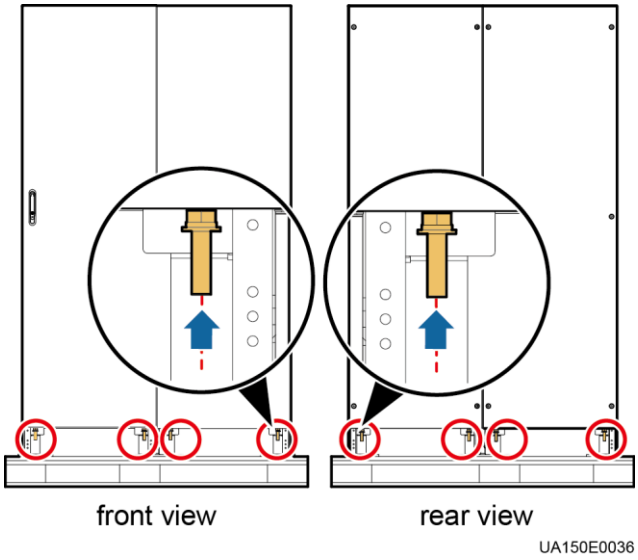
Procedure

Step 1 Use a pallet truck to transport the UPS to the installation position.

Step 2 Remove the UPS outer packing.

Step 3 Remove the bolts that secure the UPS to the pallet and remove the UPS from the pallet.

Figure 3-5 Removing the pallet from the UPS



----End

3.1.5 (Optional) Splitting the Power Cabinet and Bypass Cabinet (400 kVA, 500 kVA, or 600 kVA UPS)

Context

- If the door of the power distribution equipment room is not wide enough to move the UPS, you can split the power cabinet and bypass cabinet before the movement.
- The power cabinet and bypass cabinet of the 400 kVA, 500 kVA, and 600 kVA UPS can be split in a similar way. This section describes how to split cabinets of the 400 kVA UPS.

NOTICE

Put away the removed screws and connecting plates to facilitate future cabinet combination.

Table 3-6 and Table 3-7 list the specifications and number of screws to be removed.

Table 3-6 Specifications and number of screws (400 kVA or 500 kVA UPS)

Position	Screw Specification	Quantity (PCS)
Soft copper bar	M12x35	26
Battery copper bar component	M8x20	4
Top connecting plate	M6x30	8
Middle connecting plate	M6x30	8

Position	Screw Specification	Quantity (PCS)
Bottom connecting plate	M12x35	8

Table 3-7 Specifications and number of screws (600 kVA UPS)

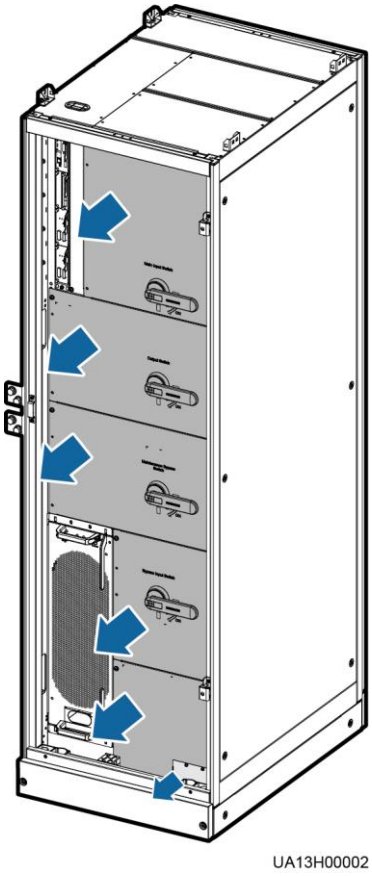
Position	Screw Specification	Quantity (PCS)
Soft copper bar	M12x45 screw assembly	26
Battery copper bar component	M6x30 screw assembly	4
Top connecting plate	M6x20 screw assembly	8
Middle connecting plate	M6x20 screw assembly	8
Bottom connecting plate	M12x35 screw assembly	8

Procedure

Step 1 Open the front door of the bypass cabinet and remove the covers of the power distribution subrack.

NOTE
The covers of the power distribution subrack can be removed from the bypass cabinet only when all switches are OFF.

Figure 3-6 Removing the covers of the power distribution subrack



Step 2 Remove the rear covers from the power cabinet and bypass cabinet.

Step 3 Remove the cable terminals that connect the system signal interface board in the power cabinet to the bypass cabinet.

Disconnect cables by referring to Figure 3-7 and Table 3-8, and cut off the cable ties on the disconnected cables.

Figure 3-7 Silk screens on the system signal interface board in the power cabinet

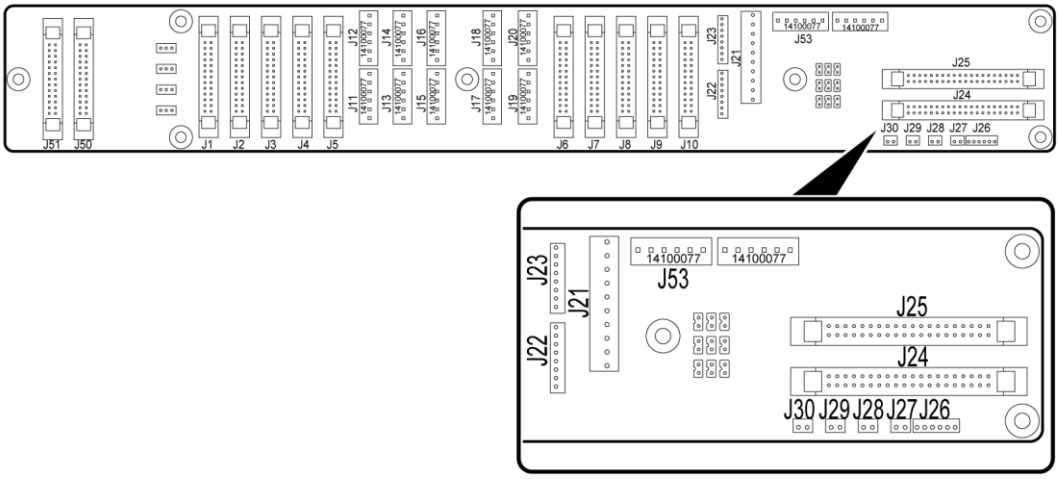


Table 3-8 Mapping between cables and ports on the system signal interface board

Bypass Cabinet Cable Name	Label on the Cable to be Connected to the System Signal Interface Board	Port Silk Screen on the System Signal Interface Board in the Power Cabinet	Quantity (PCS)
Bypass module DL37 cable	W301_J21	J21	1
	W303_J24	J24	1
ECM 8-pin cable	W305_J22	J22	1
ECM system monitoring bus	W307_J25	J25	1
CT cable	W309_J26	J26	1
Switch cable	SW1_J27	J27	1
	SW2_J28	J28	1
	SW4_J30	J30	1

⚠ CAUTION

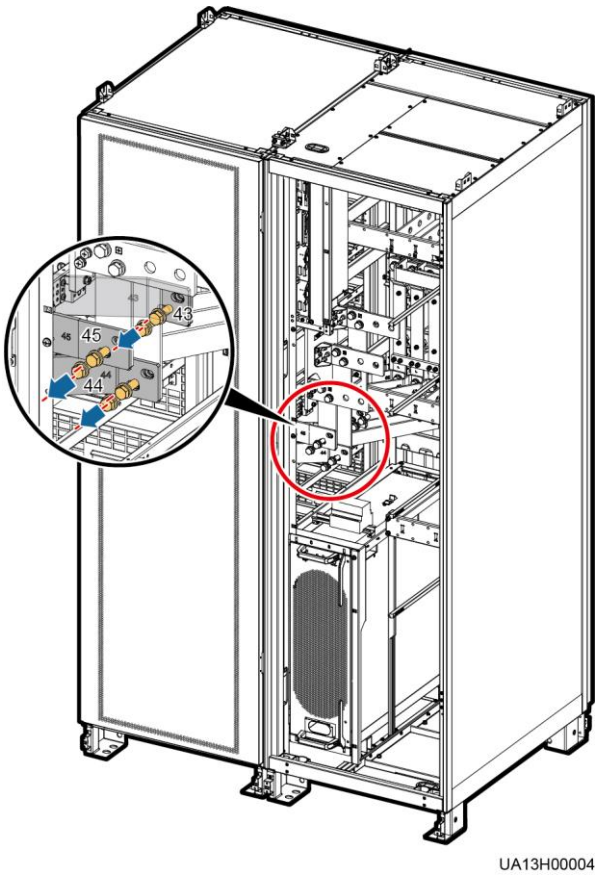
Because the switch extension rod is sharp, exercise caution when removing the connecting copper bars to prevent personal injury.

NOTICE

Each copper bar has a number on it. Put away the removed copper bars. When you combine the power cabinet and bypass cabinet, strictly follow the numbers printed on the copper bars.

Step 4 Remove the soft copper bars numbered 43, 44, and 45.

Figure 3-8 Removing soft copper bars numbered 43, 44, and 45

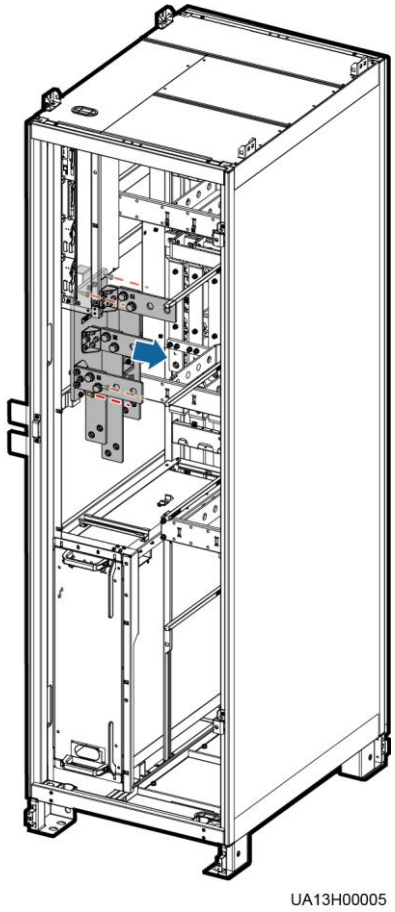


NOTE

For a 500 kVA or 600 kVA UPS, remove the soft copper bars numbered 56, 58, and 60.

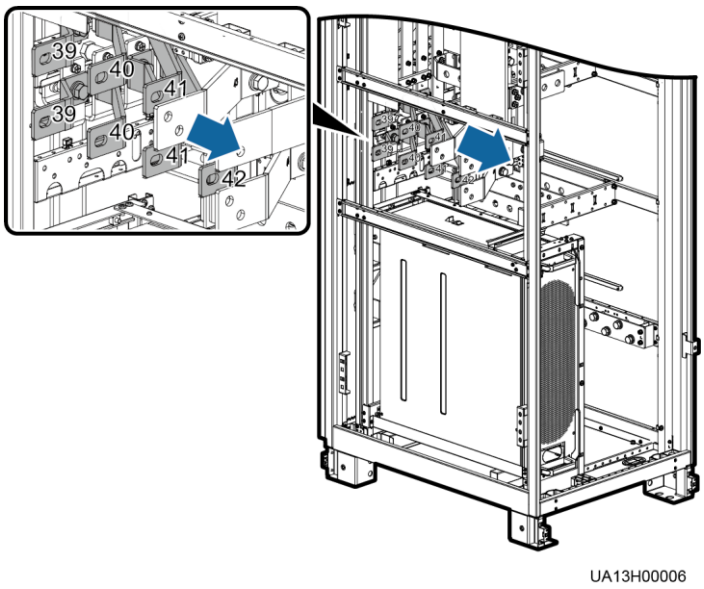
Step 5 Remove the battery copper bar component.

Figure 3-9 Removing the battery copper bar component



Step 6 Remove the soft copper bars numbered 39–42.

Figure 3-10 Removing soft copper bars numbered 39–42



NOTE

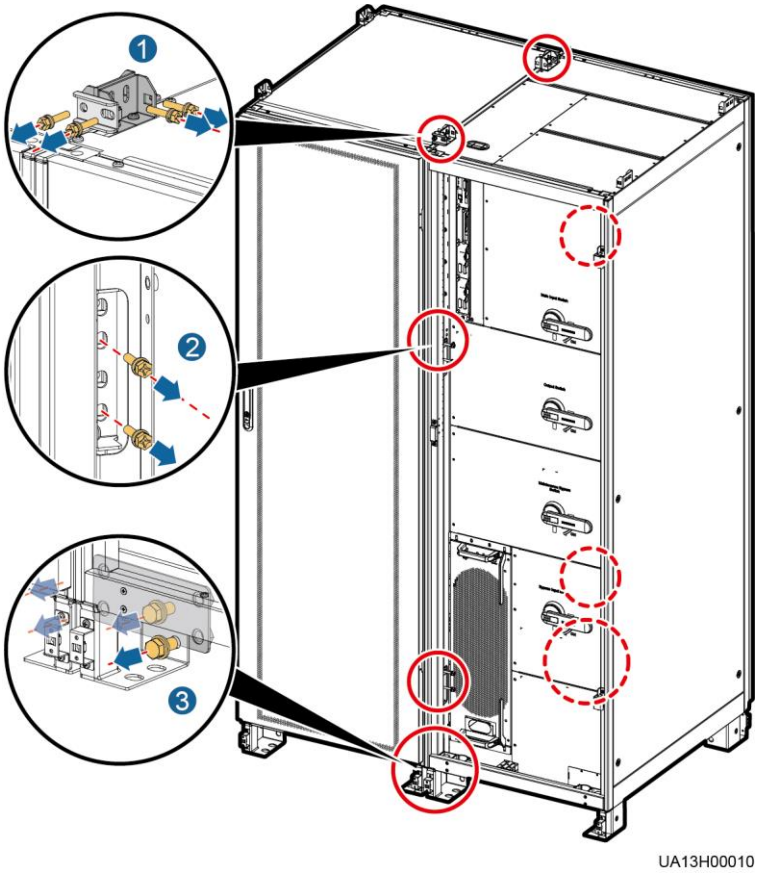
For a 500 kVA or 600 kVA UPS, remove the soft copper bars numbered 48–54.

Step 7 Remove the top, middle, and bottom connecting plates in sequence from the power cabinet and bypass cabinet.

NOTICE

Use a step ladder to remove the top connecting plates as the cabinet is high.

Figure 3-11 Removing connecting plates



Step 8 Use a manual pallet truck to transport the power cabinet and bypass cabinet to the installation position. Ensure that the two cabinets align with each other.

----End

3.1.6 (Optional) Combining the Power Cabinet and Bypass Cabinet (400 kVA, 500 kVA, or 600 kVA UPS)

Procedure

Step 1 Install the bottom, middle, and top connecting plates for the power cabinet and bypass cabinet based on screw specifications in Table 3-6 and Table 3-7.

Step 2 Install the removed soft copper bars and battery copper bar components based on their numbers by referring to screw specifications in Table 3-6 and Table 3-7.

Step 3 Reconnect the removed cables to the system signal interface board in the power cabinet, and bind the cables. For details, see Table 3-8.

Step 4 Check that the power cabinet and bypass cabinet are combined completely and securely.

Step 5 After checking that cabinets are combined properly, reinstall the side covers and rear covers.

----End

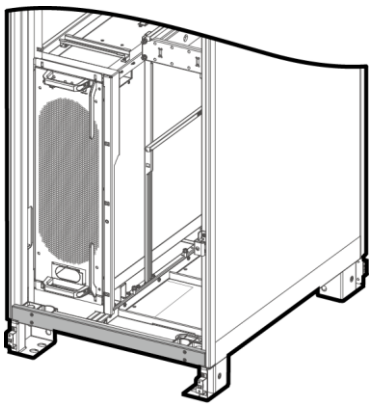
3.2 Single UPS Installation

The installation process and cable connection principle of UPSs in standard configuration and UPSs in full configuration are the same. This section uses UPSs in full configuration as an example.

NOTICE

When you install the UPS and connect cables, do not step on the front door baffle plate and the door support at the bottom of the cabinet to prevent paint flake-off and deformation, as shown in Figure 3-12. Otherwise, the front door will not be properly closed.

Figure 3-12 Front door baffle plate



3.2.1 Installing a UPS (400 kVA, 500 kVA, or 600 kVA UPS)

3.2.1.1 Installing the UPS on the Ground

Context

NOTICE

- Ensure that the installation ground is flat.
- The marking-off template is delivered with the UPS.

Procedure

Step 1 Determine the cabinet installation positions on the ground based on holes in the marking-off template for ground installation.

NOTE

- A: mounting holes on the channel steel
- B: mounting holes on the floor

Figure 3-13 Mounting hole dimensions for the 400 kVA UPS and 500 kVA UPS (unit: mm)

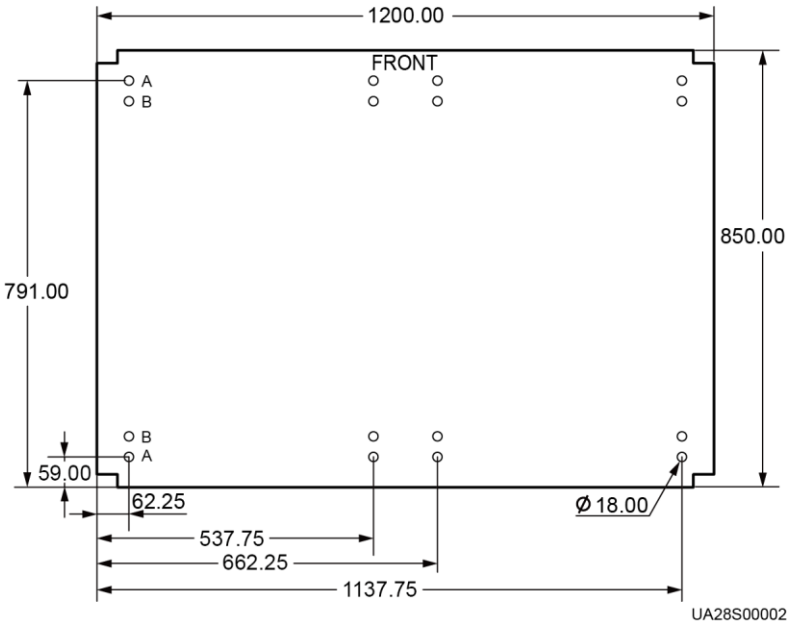
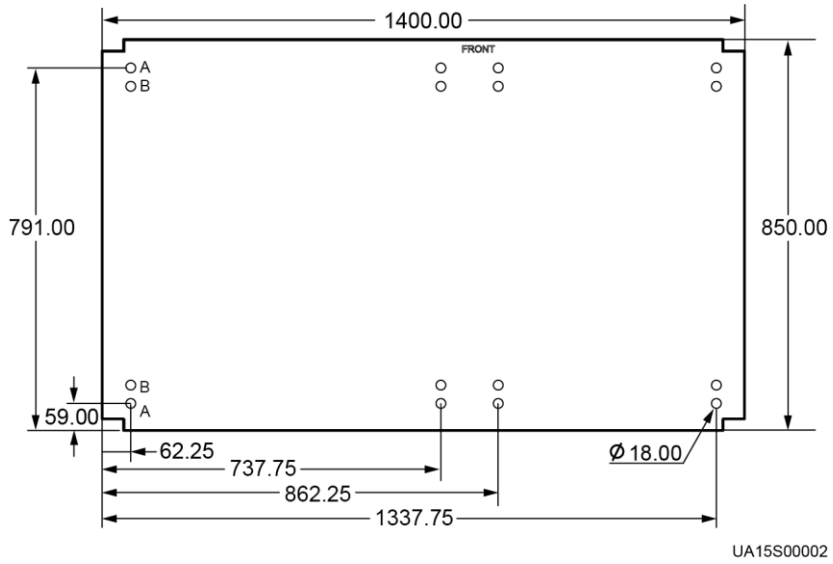
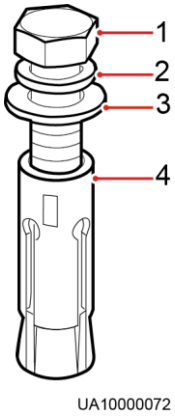


Figure 3-14 Mounting hole dimensions for the 600 kVA UPS (unit: mm)



Step 2 Use a hammer drill to drill holes for installing expansion bolts, and install expansion sleeves in the holes. Figure 3-15 shows expansion bolt composition. Figure 3-16 shows how to install an expansion bolt.

Figure 3-15 Expansion bolt composition

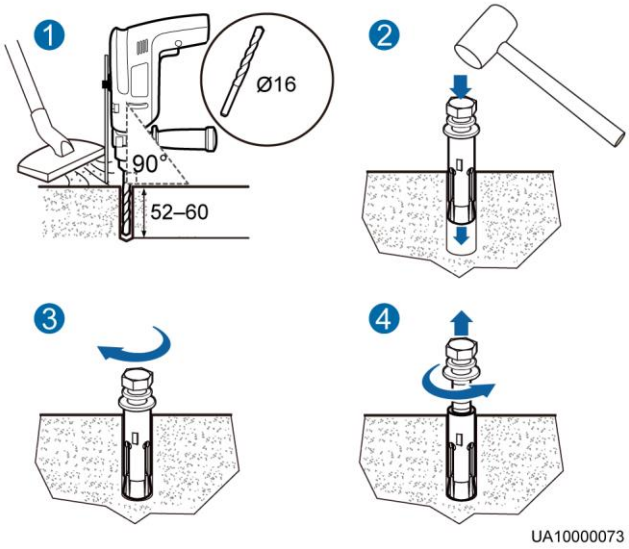


(1) M12 bolt (2) Spring washer (3) Flat washer (4) Expansion sleeve

NOTICE

Knock the expansion bolt into the hole until the expansion sleeve completely fits into the hole. The expansion sleeve must be completely buried under the ground to facilitate subsequent installation.

Figure 3-16 Installing an expansion bolt (unit: mm)

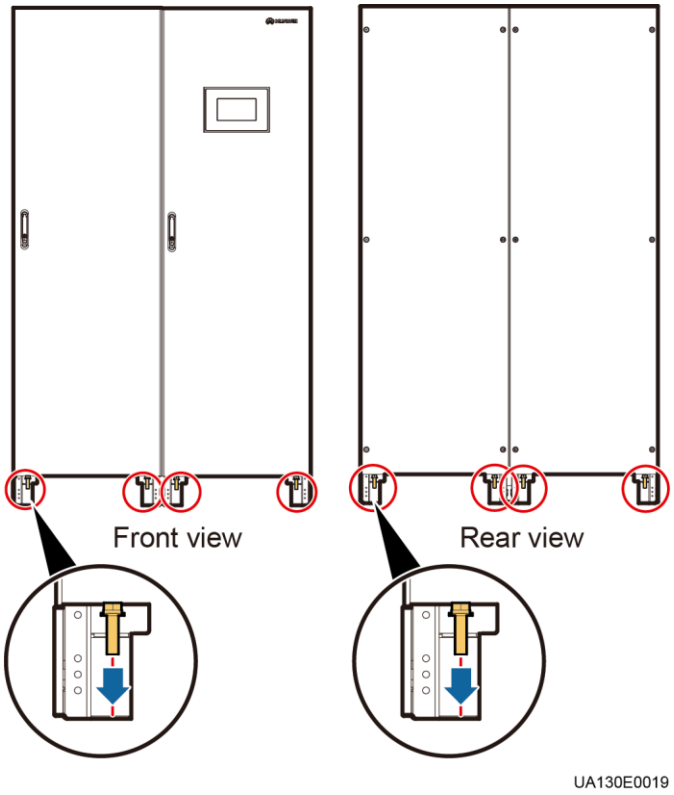


1. Drill holes in the ground by using a hammer drill. The hole depth is 52 mm to 60 mm.
2. Partially tighten the expansion bolt and vertically insert it into the hole. Knock the expansion bolt using a rubber mallet until the expansion sleeve is fully inserted into the hole.
3. Partially tighten the expansion bolt.
4. Remove the bolt, spring washer, and flat washer.

Step 3 Use a pallet truck to move the cabinet to the installation position.

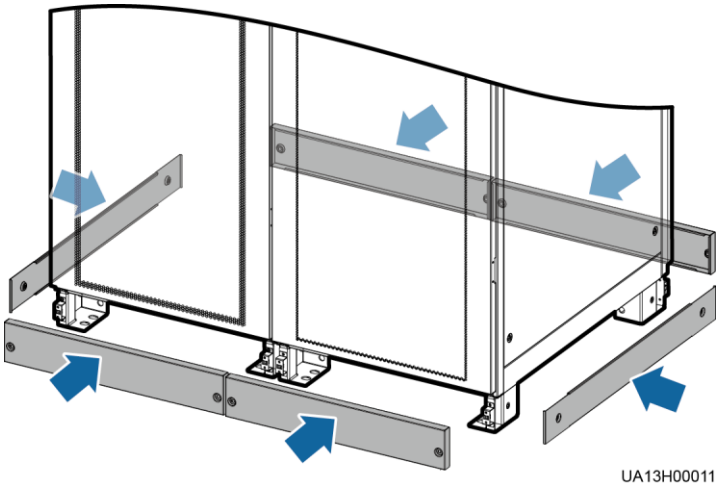
Step 4 Secure the cabinet to the expansion bolt holes on the ground using M12x60 expansion bolts. The installation methods for different UPS models are the same. Figure 3-17 shows how to secure a 400 kVA UPS cabinet.

Figure 3-17 Tightening expansion bolts



Step 5 Install the front, rear, left, and right anchor baffle plates. The installation methods for different UPS models are the same. Figure 3-18 shows how to install anchor baffle plates for a 400 kVA UPS cabinet.

Figure 3-18 Installing the front, rear, left, and right anchor baffle plates



Step 6 To prevent misoperations, you are advised to install a lock (with the diameter of the valid lock cylinder being 5–10 mm) for the maintenance bypass switch, as shown in Figure 3-19 and Figure 3-20.

Figure 3-19 Installing a lock for the maintenance bypass switch (400 kVA UPS, 500 kVA UPS)

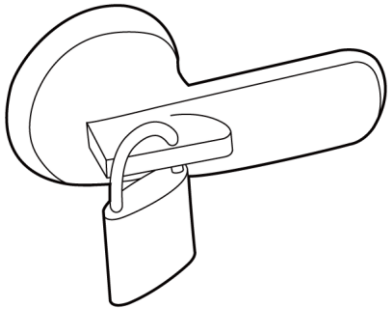
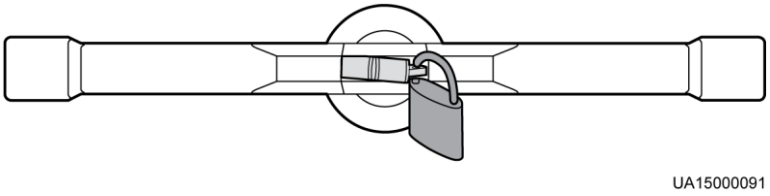


Figure 3-20 Installing a lock for the maintenance bypass switch (600 kVA UPS)



----End

3.2.1.2 Installing the UPS on Channel Steel

Context

NOTICE

- Channel steel and expansion bolts for securing the channel steel should be purchased by the customer. The recommended channel steel width is 50 mm or more.
- Ensure that the spacing between external sides of a channel steel is 800 mm. Secure channel steel to the ground by using expansion bolts.
- Cabinet mounting holes must be aligned with channel steel mounting holes, and secure the cabinet to channel steel with bolts.
- Keep the channel steel surface flat.

Procedure

Step 1 Determine the cabinet installation positions on the channel steel based on holes in the marking-off template for channel steel installation.

NOTE

- A: mounting holes on the channel steel
- B: mounting holes on the floor

Figure 3-21 Mounting hole dimensions for the 400 kVA UPS and 500 kVA UPS (unit: mm)

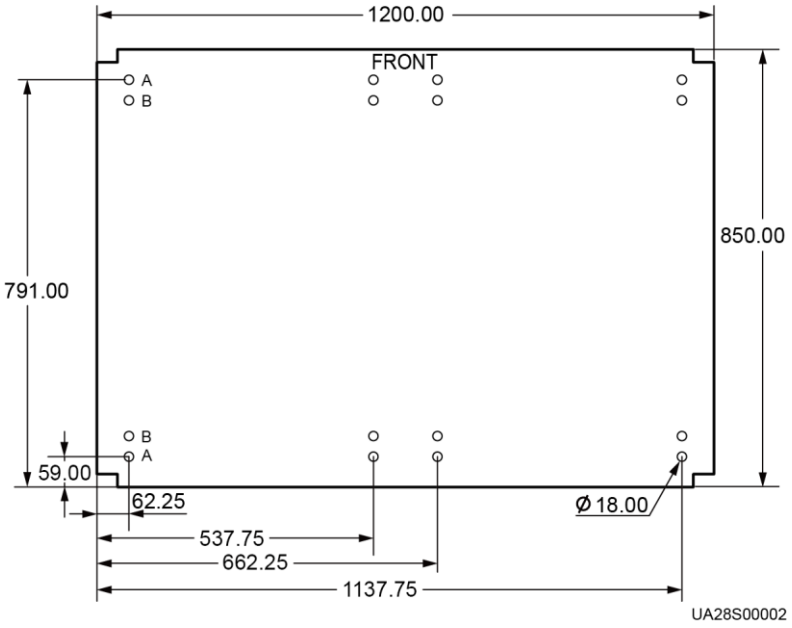
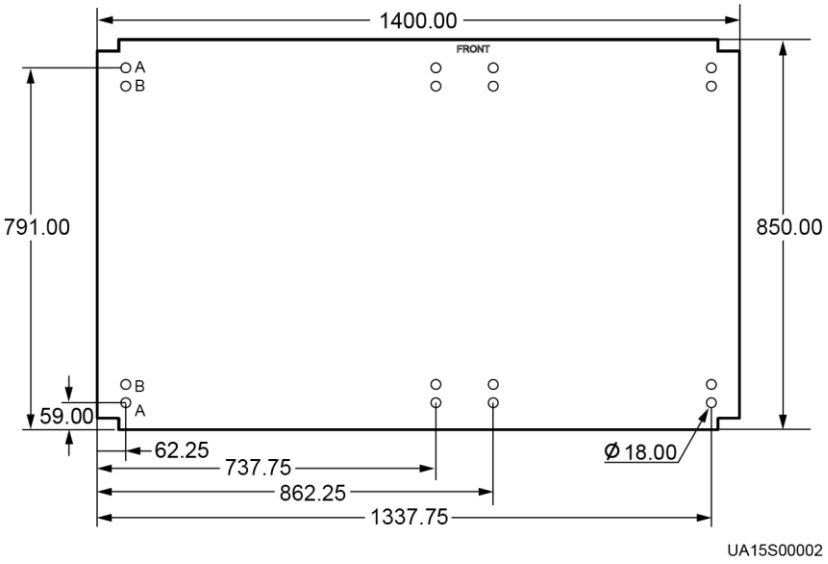


Figure 3-22 Mounting hole dimensions for the 600 kVA UPS (unit: mm)



Step 2 Drill cabinet mounting holes in channel steel by using a hammer drill.

Step 3 Use a pallet truck to move the cabinet to the installation position.

Step 4 Use common M12x45 bolts to secure the cabinets into the mounting holes in the channel steel and tighten the bolts.

Step 5 Install the front, rear, left, and right anchor baffle plates.

----End

3.2.2 Installing a UPS (880 kVA)

3.2.2.1 Installing the UPS on the Ground

Determining the UPS Installation Position

NOTICE

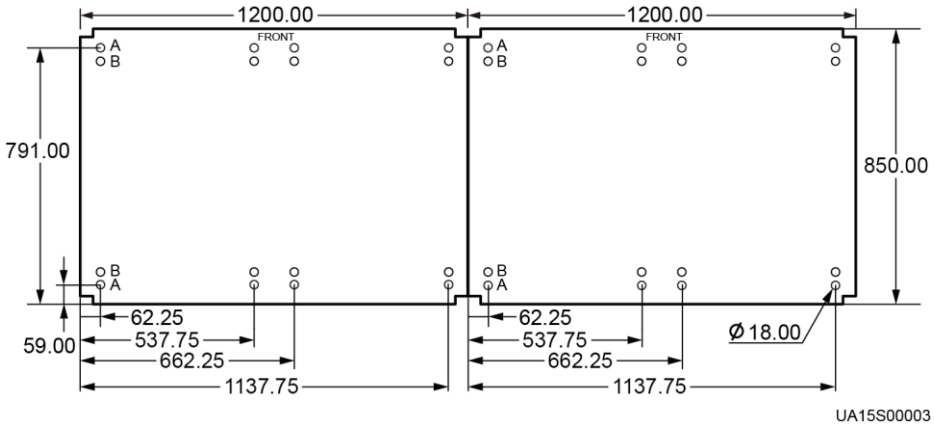
- Ensure that the installation ground is flat.
- The marking-off template is delivered with the UPS.

Step 1 Determine the cabinet installation positions on the ground based on holes in the marking-off template for ground installation.

NOTE

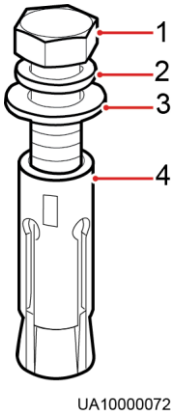
- A: mounting holes on the channel steel
- B: mounting holes on the floor

Figure 3-23 Hole dimensions (unit: mm)



Step 2 Use a hammer drill to drill holes for installing expansion bolts, and install expansion sleeves in the holes. Figure 3-24 shows expansion bolt composition. Figure 3-25 shows how to install an expansion bolt.

Figure 3-24 Expansion bolt composition

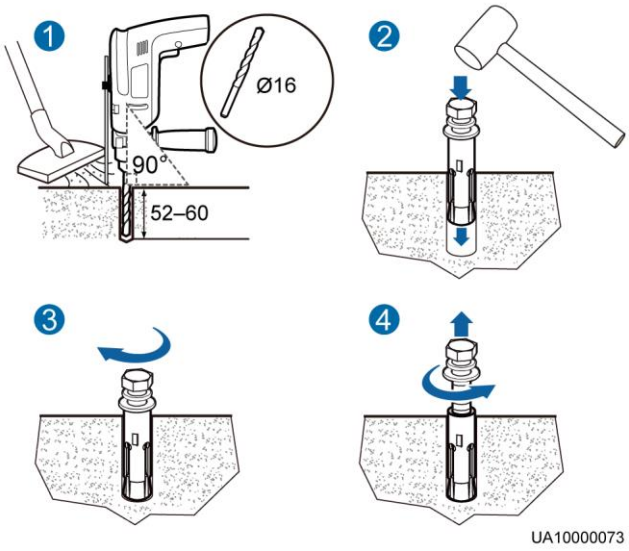


(1) M12 bolt (2) Spring washer (3) Flat washer (4) Expansion sleeve

NOTICE

Knock the expansion bolt into the hole until the expansion sleeve completely fits into the hole. The expansion sleeve must be completely buried under the ground to facilitate subsequent installation.

Figure 3-25 Installing an expansion bolt (unit: mm)



1. Drill holes in the ground by using a hammer drill. The hole depth is 52 mm to 60 mm.
2. Partially tighten the expansion bolt and vertically insert it into the hole. Knock the expansion bolt using a rubber mallet until the expansion sleeve is fully inserted into the hole.
3. Partially tighten the expansion bolt.
4. Remove the bolt, spring washer, and flat washer.

----End

Combining Power Cabinets and Bypass Cabinets

The power cabinets and bypass cabinets are separately packed for delivery. Before installing the UPS, combine the power cabinets and bypass cabinets. Before combining the cabinets, ensure that the required fittings are complete. Table 3-9 lists the fittings.

Table 3-9 Fitting list

Mounting Fitting	Number of Fittings	Screw Specifications	Number of Bolts (PCS)	Torque (N·m)	Remarks
Bottom connecting plate	2	M12x25	8	47	• Fittings are delivered with the UPS. You can see the fittings after unpacking the bypass cabinet. • The two soft copper bars are numbered 52. • If holes are drilled for routing cables at the top of the cabinet, attach
Top connecting plate	2	M6x30	8	3	
Soft connecting copper bar	2	M12x45	10	47	

Mounting Fitting	Number of Fittings	Screw Specifications	Number of Bolts (PCS)	Torque (N·m)	Remarks
Grommet strip	N/A	N/A	N/A	N/A	grommet strips on the hole edges to protect cables.
Middle connecting plate	2	M6x30	4	3	Installed on the cabinet before delivery.

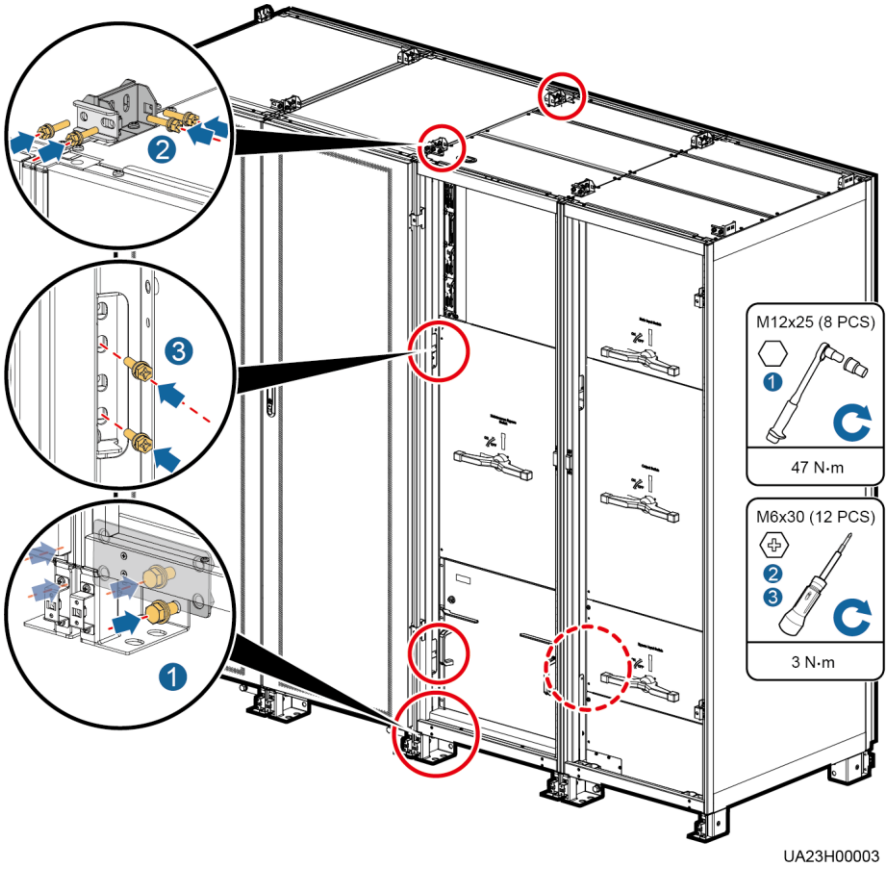
Step 1 Use a pallet truck to move the power cabinets and bypass cabinets to the mounting holes for the cabinets with the power cabinets on the left and the bypass cabinets on the right. Align the cabinets.

NOTE
Use a pallet truck to adjust the position of the bypass cabinets to align the front doors of the bypass cabinets with the front doors of the power cabinets.

Step 2 Open the front doors of the power cabinets and bypass cabinets.

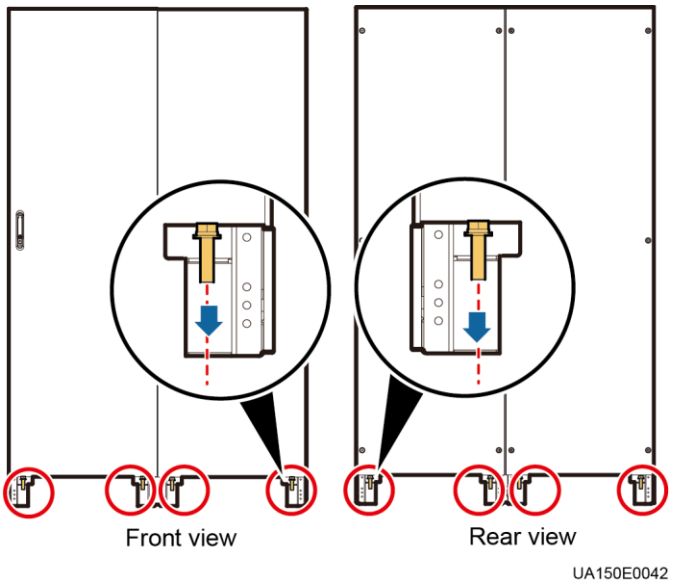
Step 3 Install the connecting plates between the bypass cabinet and its adjacent power cabinet based on the following sequence: bottom, top, and middle connecting plates.

Figure 3-26 Installing connecting plates



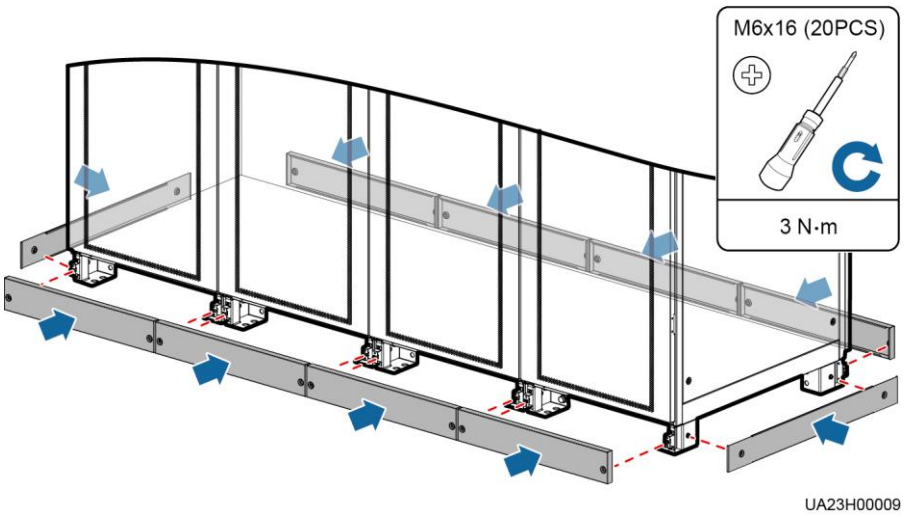
Step 4 Use M12x60 expansion bolts to secure the cabinets to the expansion bolt holes on the ground. Figure 3-27 shows how to secure the power cabinets.

Figure 3-27 Tightening expansion bolts



Step 5 Install the front, rear, left, and right anchor baffle plates.

Figure 3-28 Installing the front, rear, left, and right anchor baffle plates

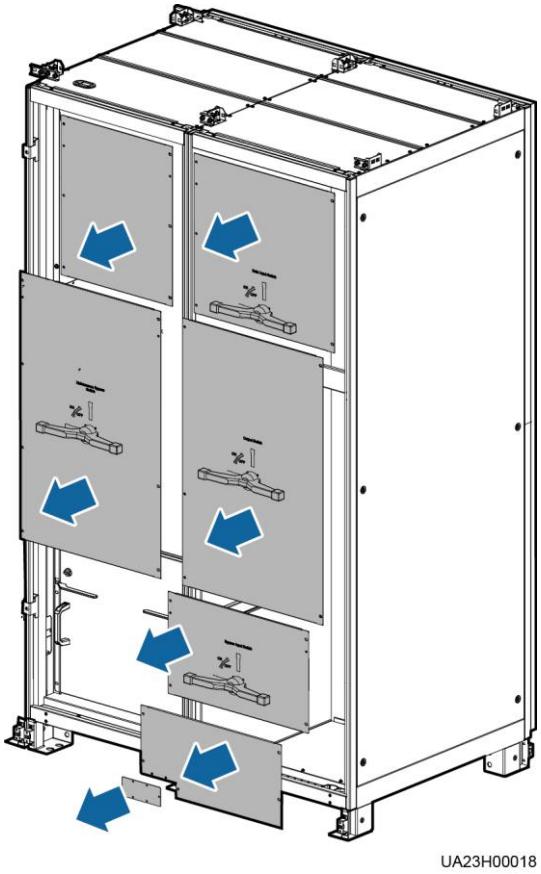


Step 6 Remove the front covers of the power distribution subrack from the bypass cabinets, as shown in Figure 3-29.

NOTE

The front covers of the power distribution subrack can be removed only when all the switches are OFF.

Figure 3-29 Removing the front covers of the power distribution subrack



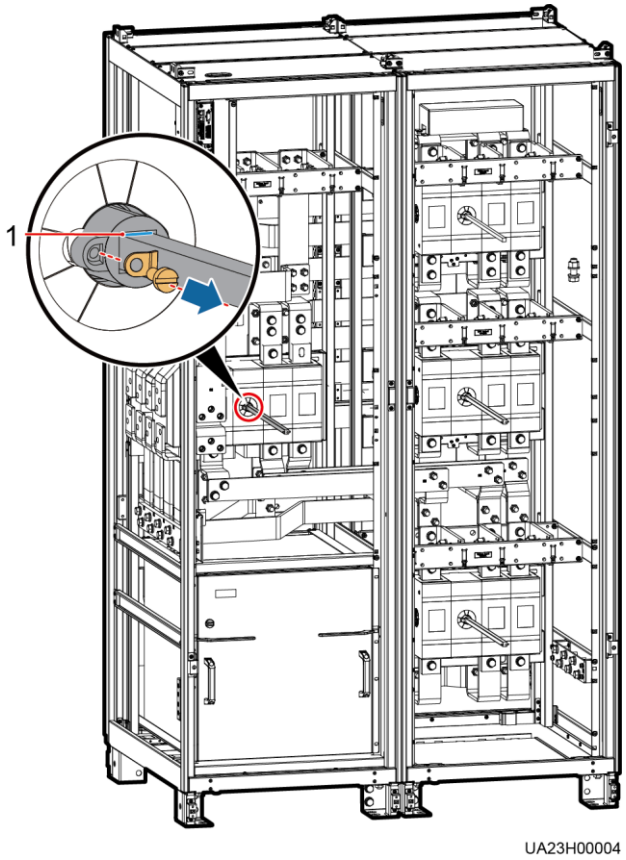
Step 7 Remove the rear covers from power cabinet 1 and its adjacent bypass cabinet.

Step 8 (Optional) Remove the extension rod of the maintenance bypass switch from the bypass cabinet.

NOTE

- To facilitate cabinet combination, remove the switch extension rod from the left bypass cabinet. The operation of removing the switch extension rod from the right bypass cabinet is optional.
- Put away the removed screws, washers, and switch extension rod which need to be reinstalled after cables are connected.
- When reinstalling the switch extension rod, keep the dowel level, as shown in Figure 3-30. Insert the switch extension rod to the blue mark, put washers, and tighten the slotted screw to reinstall the switch extension rod.

Figure 3-30 Removing the switch extension rod

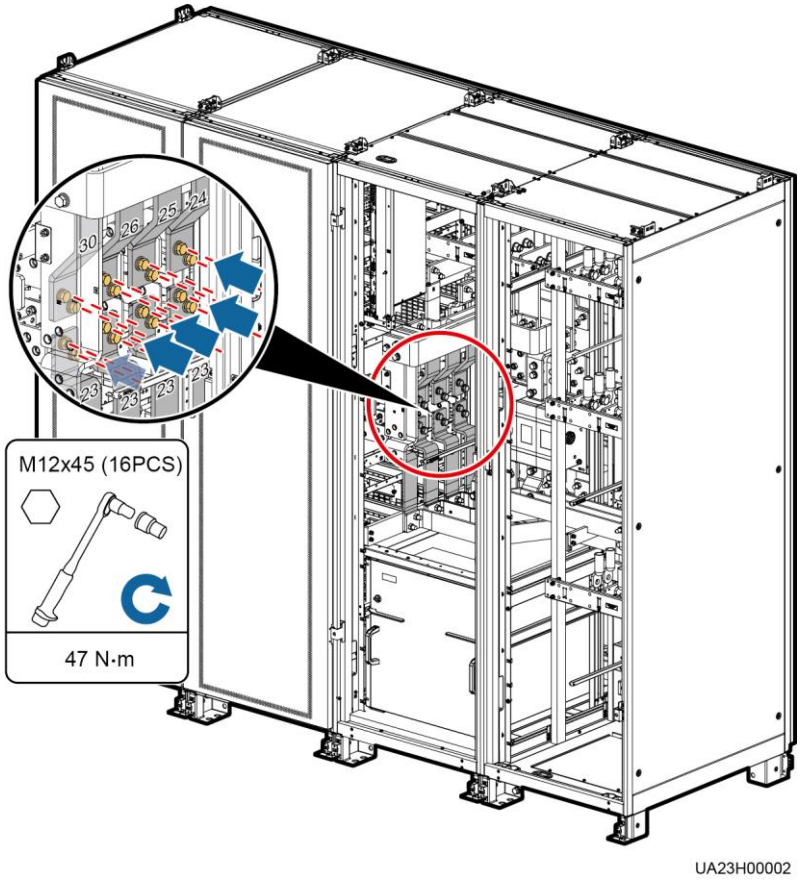


(1) Blue mark

Step 9 Install the soft copper bars between power cabinet 1 and its adjacent bypass cabinet.

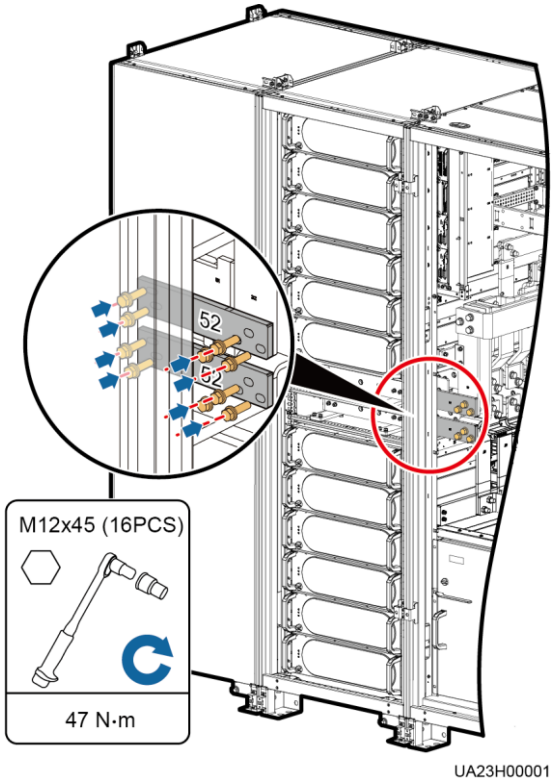
1. Cut off the cable ties bound between holes in soft copper bars numbered 23, 24, 25, 26, and 30.
2. Secure the soft copper bars numbered 23, 24, 25, 26, and 30 using M12x45 screws, as shown in Figure 3-31.

Figure 3-31 Securing soft copper bars



3. Remove filler panels from power cabinet 1. Take out two soft copper bars numbered 52 from the fittings, and secure them to power cabinet 1 and its adjacent bypass cabinet respectively, as shown in Figure 3-32.

Figure 3-32 Installing the soft copper bars numbered 52



Step 10 Insert the cable terminals in the bypass cabinets into the corresponding ports on the system signal interface board in power cabinet 1. The system signal interface board is located at the rear of power cabinet 1. It can be seen if the cabinet rear cover is removed.

NOTICE

- Cut off the cable ties binding the cables to be connected in the bypass cabinet. When connecting the cables of the bypass cabinet to power cabinet 1, route the cables from the internal side of the column to the system signal interface board of power cabinet 1 so that the rear panels can be reinstalled on the bypass cabinet and power cabinet 1.
- After the cables have been connected, bind the cables to the column of the bypass cabinet and the binding holes on the system signal interface board. Verify that the cables are correctly connected and reinstall the rear panels.

The port silk screens on the system signal interface board in power cabinet 1 are shown in Figure 3-33. The mapping between the cables in the bypass cabinets and the ports on the system signal interface board is listed in Table 3-10. Figure 3-34 shows cable connections for combined cabinets.

Figure 3-33 Silk screens on the system signal interface board in power cabinet 1

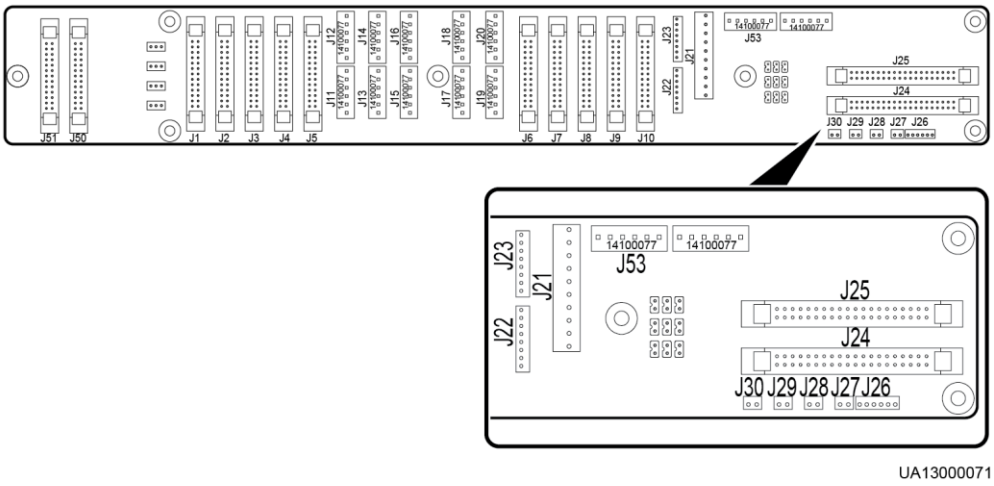


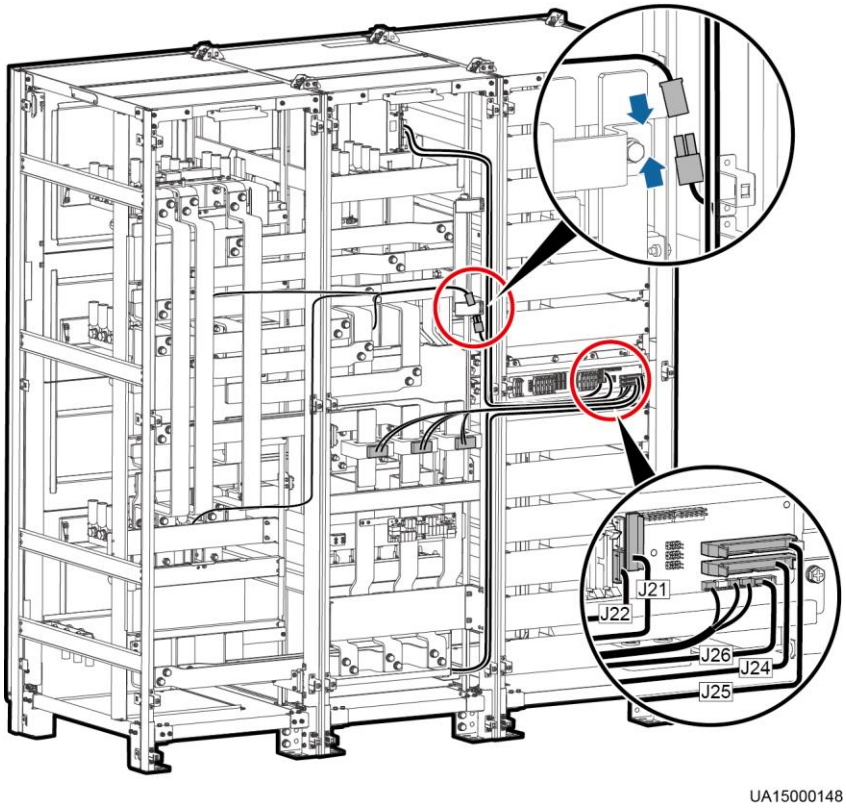
Table 3-10 Mapping between the cables in the bypass cabinet and the ports on the system signal interface board in power cabinet 1

Bypass Cabinet Cable Name	Bypass Cabinet Cable No.	Silk Screen on System Signal Interface Board in Power Cabinet or Cable No.	Quantity
Bypass module DL37 cable	W301_J21	J21	1
	W303_J24	J24	1
ECM 8-pin cable	W305_J22	J22	1
ECM system monitoring bus	W307_J25	J25	1
CT cable	W309_J26	J26	1
Switch cable	• Full configuration: 04091625-06 • Standard configuration: SW1310	04091626-23	1

NOTE

A standard configuration model has only one switch cable (maintenance bypass switch). A full configuration model has three switch cables (output switch, maintenance bypass switch, and bypass input switch). The following figure describes how to connect cables for combined cabinets using a full configuration model as an example.

Figure 3-34 Connecting cables for combined cabinets



----End

3.2.2.2 Installing the UPS on Channel Steel

NOTICE

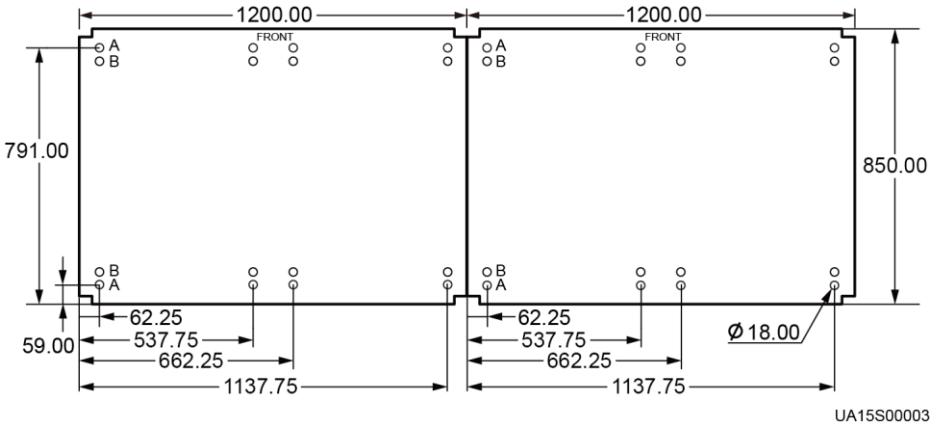
- Channel steel and expansion bolts for securing the channel steel should be purchased by the customer. The recommended channel steel width is 50 mm or more.
- Ensure that the spacing between external sides of a channel steel is 800 mm. Secure channel steel to the ground by using expansion bolts.
- Keep the channel steel surface flat.

Step 1 Determine the cabinet installation positions on the channel steel based on holes in the marking-off template for channel steel installation.

NOTE

- A: mounting holes on the channel steel
- B: mounting holes on the floor

Figure 3-35 Hole dimensions (unit: mm)



Step 2 Drill cabinet mounting holes in channel steel by using a hammer drill.

----End

Combining Power Cabinets and Bypass Cabinets

Step 1 The power cabinets and bypass cabinets are combined in the same way for ground installation and channel steel installation.

----End

Securing the UPS

Step 1 Use common M12x45 bolts to secure the cabinets into the mounting holes in the channel steel and tighten the bolts.

Step 2 Install the front, rear, left, and right anchor baffle plates.

----End

3.2.3 Installing Batteries

Context

DANGER

- Before installing batteries, read through the battery safety precautions, obtain the delivered battery installation guide, and install batteries as instructed.
- Place the batteries in a correct way to prevent vibrations and shocks.
- Install the batteries from the lower layer to the upper layer to prevent falling over due to imbalance.

Procedure

Step 1 Install a battery rack and batteries.

For details, see the battery installation guide delivered along with batteries.

----End

3.2.4 Installing Optional Components

3.2.4.1 Installing Antiseismic Kits

NOTICE

Install antiseismic kits only when the cabinet is ground-mounted.

Step 1 Mark mounting holes on the ground based on the marking-off templates. Figure 3-36 to Figure 3-38 show the dimensions of antiseismic kit mounting holes.

Figure 3-36 Dimensions of antiseismic kit mounting holes for the 400 kVA UPS and 500 kVA UPS (unit: mm)

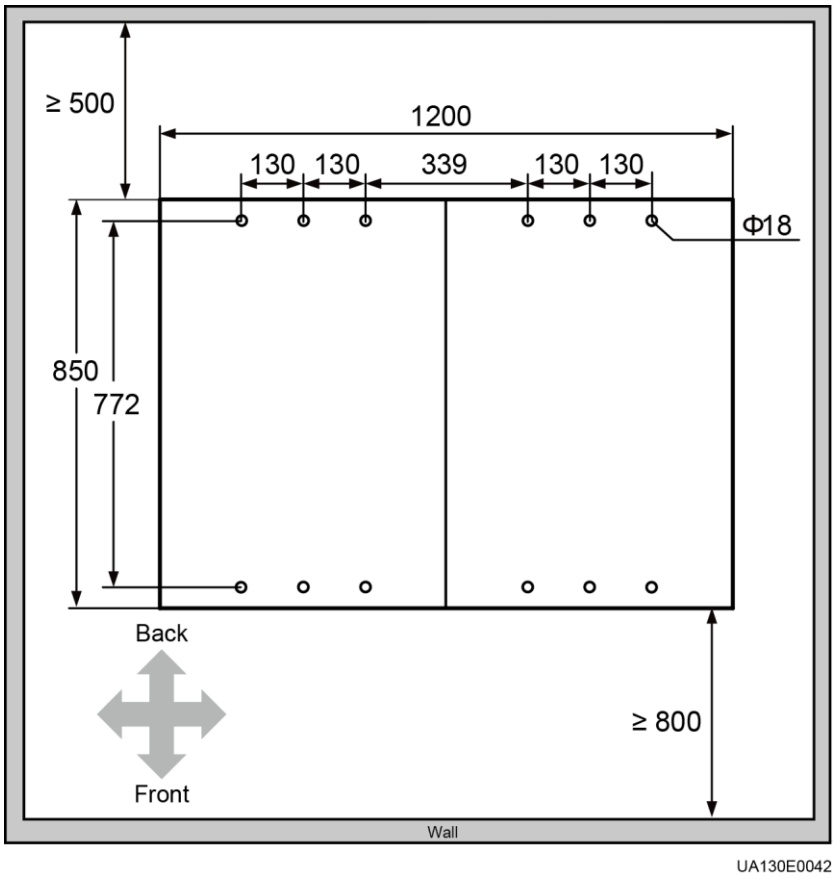


Figure 3-37 Dimensions of antiseismic kit mounting holes for the 600 kVA UPS (unit: mm)

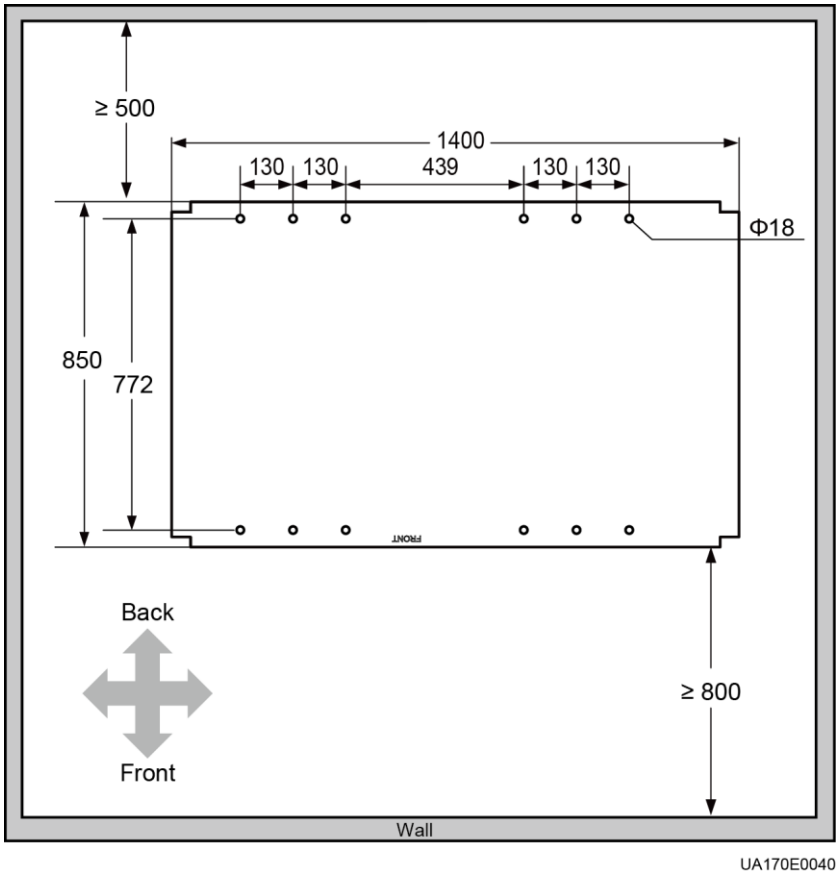
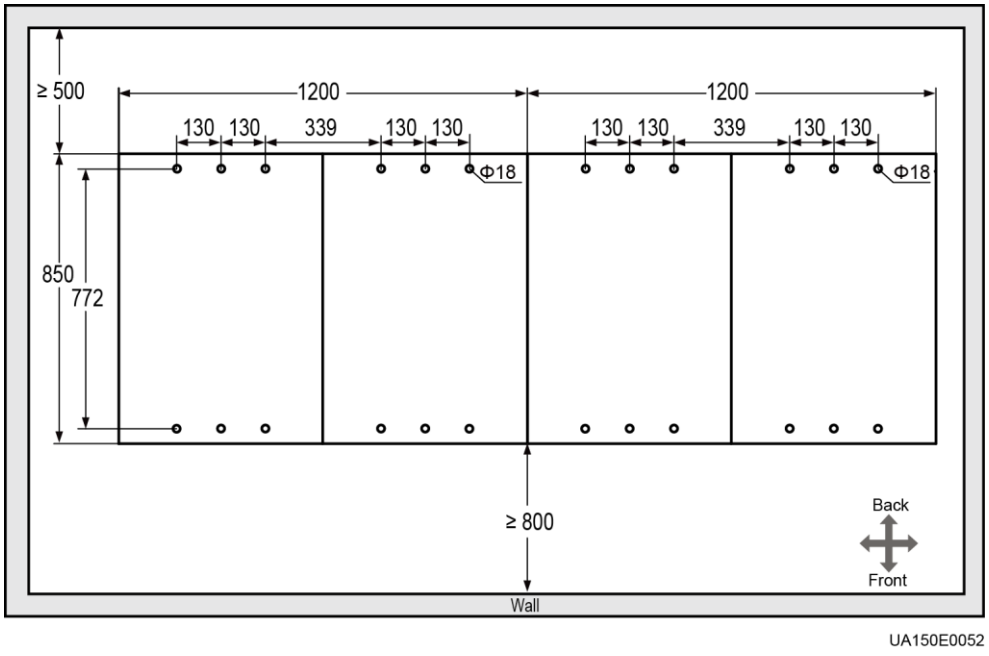


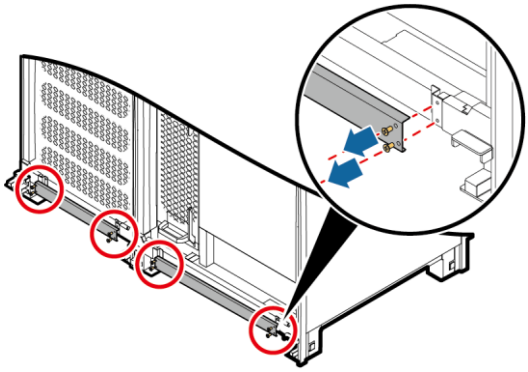
Figure 3-38 Dimensions of antiseismic kit mounting holes for the 880 kVA UPS (unit: mm)



Step 2 Drill holes for installing expansion bolts, and install expansion sleeve.

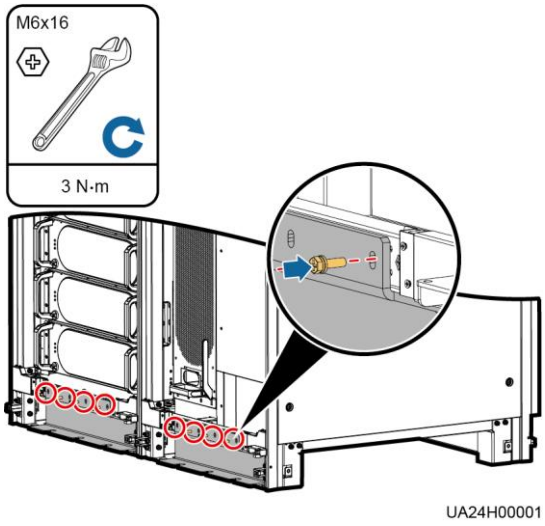
Step 3 Open the front door of the cabinet and remove the support baffle plates from the front of the cabinet. The methods of removing baffle plates for different UPS models are the same. Figure 3-39 shows how to remove support baffle plates for a 600 kVA UPS. Remove the rear cover.

Figure 3-39 Removing support baffle plates



Step 4 Secure the antiseismic kits to the front and back of the cabinet using M6 screws. The tightening torque is 3 N·m. The installation methods for different UPS models are the same. Figure 3-40 shows how to install antiseismic kits for a 600 kVA UPS.

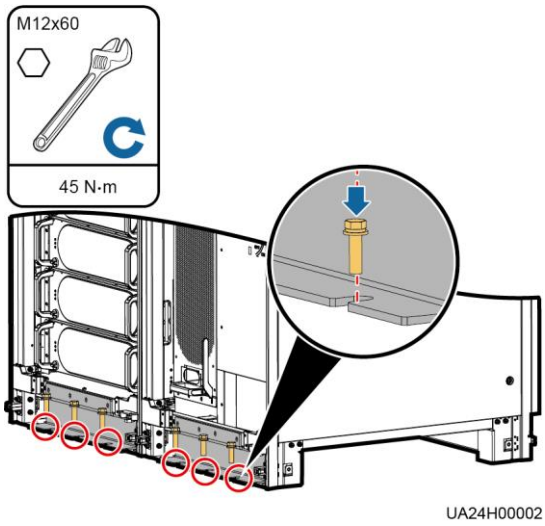
Figure 3-40 Securing the antiseismic kits to the cabinet



Step 5 Adjust the cabinet to ensure that the expansion bolt holes align with the half holes below.

Step 6 Use expansion bolts to firmly lock the front and rear antiseismic kits to the ground. The installation methods for different UPS models are the same. Figure 3-41 shows how to lock antiseismic kits for a 600 kVA UPS.

Figure 3-41 Locking the antiseismic kits to the ground



Step 7 Reinstall the support baffle plates and rear covers in the cabinet.

Step 8 Install the front, rear, left, and right anchor baffle plates.

----End

3.2.4.2 Installing an IP21 Component

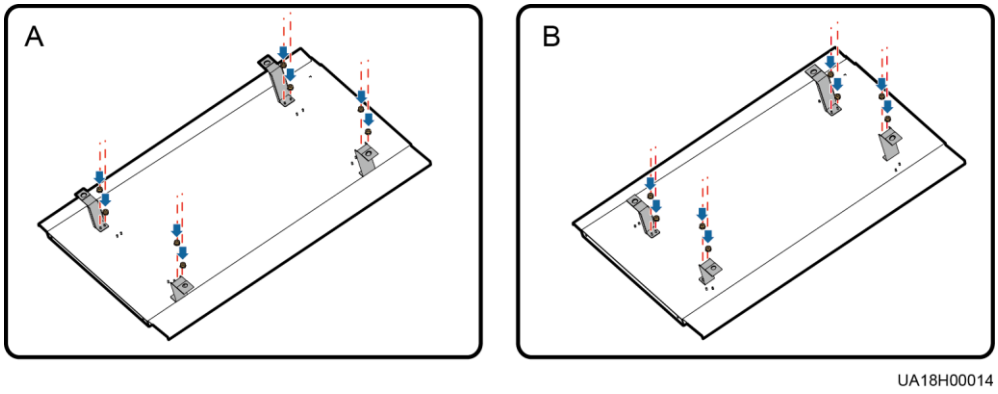
Procedure

Step 1 Install leveling feet at the bottom of the IP21 component, with two long feet on the front and two short feet at the rear.

NOTE

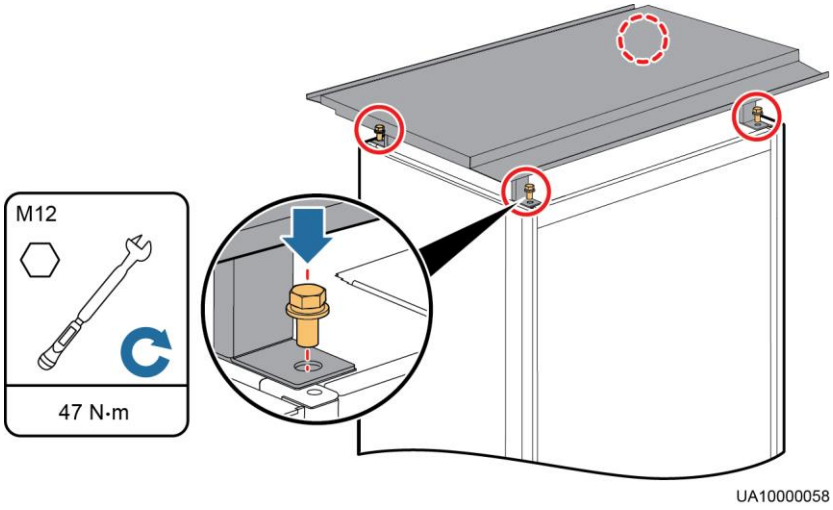
- Refer to the "front" and "back" silk screens on the surface of the IP21 component.
- Select the mounting holes for leveling feet based on the cabinet width onsite.

Figure 3-42 Installing leveling feet



Step 2 Secure the IP21 component to the top of each cabinet using four M12 screws.

Figure 3-43 Installing the IP21 component



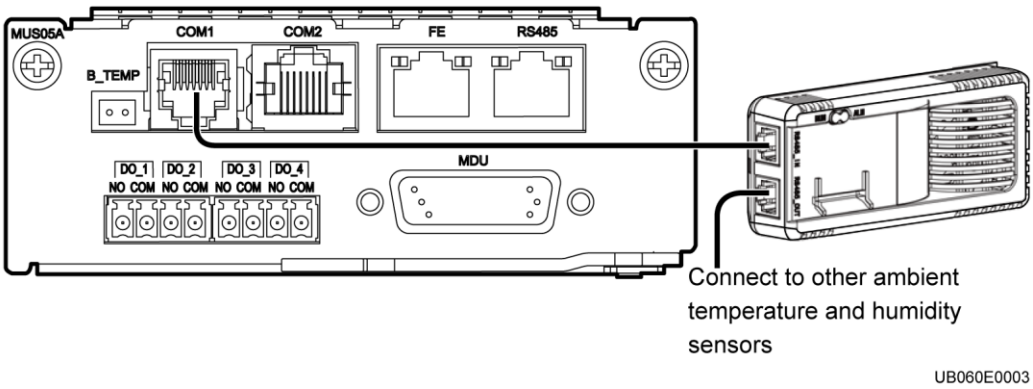
----End

3.2.4.3 Connecting an Ambient T/H Sensor

Procedure

Step 1 Connect the RJ11 port on the ambient T/H sensor to the COM1 port on the monitoring interface card.

Figure 3-44 Connecting a UPS and an ambient T/H sensor



NOTE

The ambient T/H sensor can be used as a battery temperature sensor.

----End

3.2.4.4 Connecting the BCB Box

Open the cover of the battery circuit breaker box (BCB box), and connect the BCB port on the dry contact card to the control signal port on the BCB box. For details, see *PDU8000-(0125, 0250, 0400, 0630, 0800) DCV8-BXA001 BCB-BOX User Manual*.

NOTICE

After you install the BCB box, adjust the disconnection protection threshold of the end-of-discharge (EOD) based on backup time to avoid overcurrent disconnection. The default values are as follows:

1. If backup time < 1 h, EOD is 1.67 V/cell.
2. If 1 h ≤ backup time < 3 h, EOD is 1.75 V/cell.
3. If backup time ≥ 3 h, EOD is 1.80 V/cell.

3.2.4.5 Connecting the BBB Box

Connect the BBB box. For details, see the *PDU8000-(0630, 1250, 2000) DCV8-BGA001 BBB Box User Manual*.

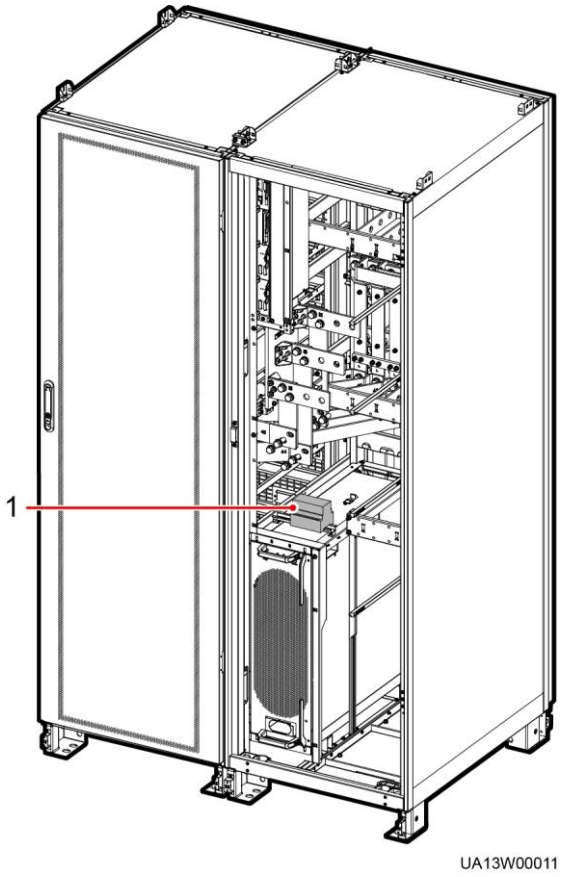
3.2.4.6 Installing a Battery Grounding Failure Detector

Procedure

Step 1 Install a battery grounding failure detector.

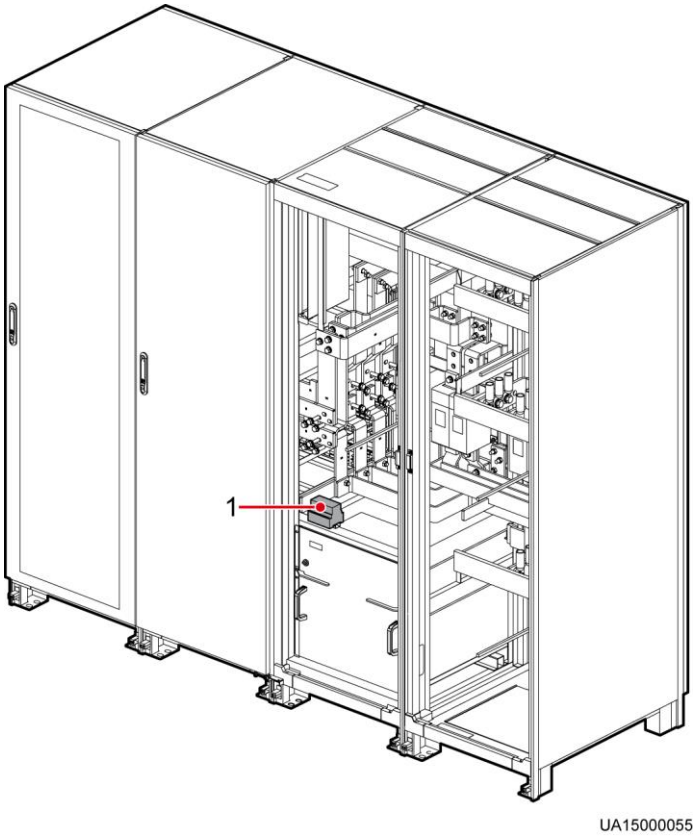
For the installation method, see *UPS Battery Grounding Failure Detector User Manual*.

Figure 3-45 Position of a battery grounding failure detector in the 400 kVA, 500 kVA, or 600 kVA UPS



(1) Battery grounding failure detector

Figure 3-46 Position of a battery grounding failure detector in the 880 kVA UPS



(1) Battery grounding failure detector

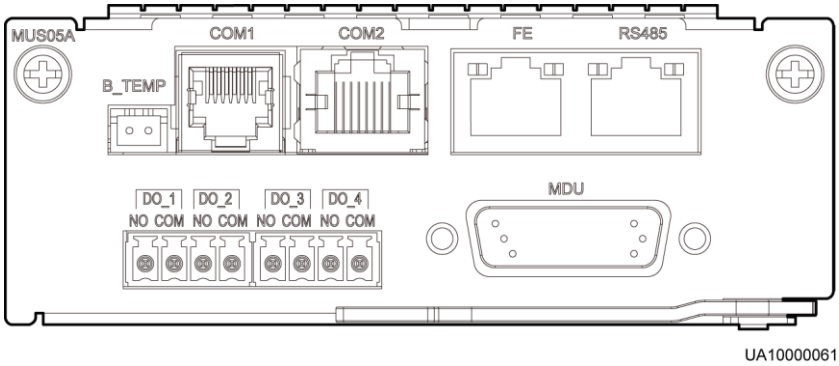
----End

3.2.4.7 Connecting the iBAT

Procedure

Step 1 Connect the COM_OUT port on the CIM of the iBAT to the COM2 port on the monitoring interface card.

Figure 3-47 COM2 port



----End

3.2.5 UPS Cable Connection Reference

Context

CAUTION

- Keep away from cabinets when preparing cables to prevent cable scraps from entering the cabinets. Cable scraps may cause ignition during power-on and result in personal injury and device damage.
- After installing cables, clean the cabinet top, bottom, copper bar wiring positions, and other positions. Ensure that there is no dust or scraps inside and around cabinets.
- Prepare terminals onsite. The length of the copper wire should be the same as that of the part of the terminal that covers the conductor.

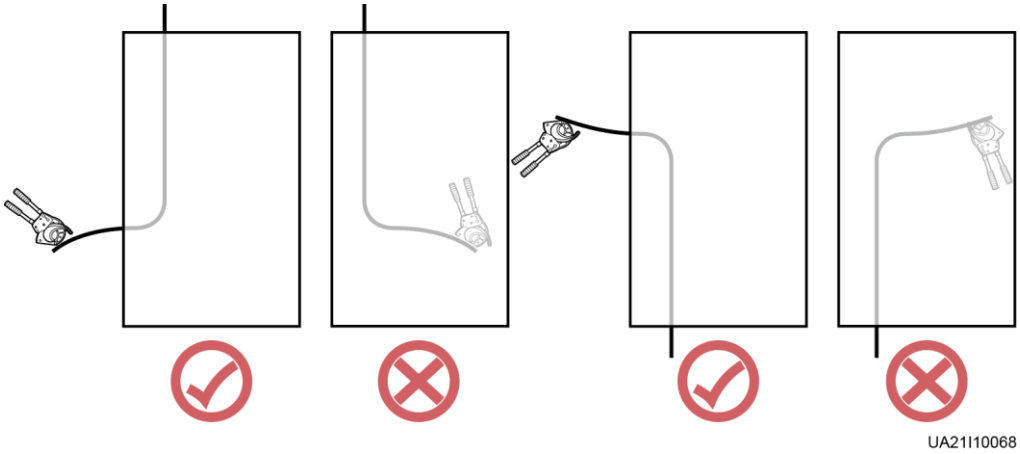
Procedure

Step 1 Route a cable into the cabinet and bind it to a nearby beam.

Step 2 Pull the cable to the copper bar to which the cable is to be connected, determine the cable length, and mark the cable at the position where the cable is to be cut.

Step 3 Pull the marked cable out of the cabinet, cut the cable from the marked position, strip the cable, and crimp a terminal.

Figure 3-48 Preparing a cable terminal outside the cabinet



NOTE

Choose an appropriate cabling route based on the actual situation. The figure is for reference only.

Step 4 Connect the cable with a crimped terminal to the corresponding copper bar.

Step 5 Clean foreign matter inside the cabinet.

----End

3.2.6 Routing Cables (400 kVA, 500 kVA, or 600 kVA UPS)

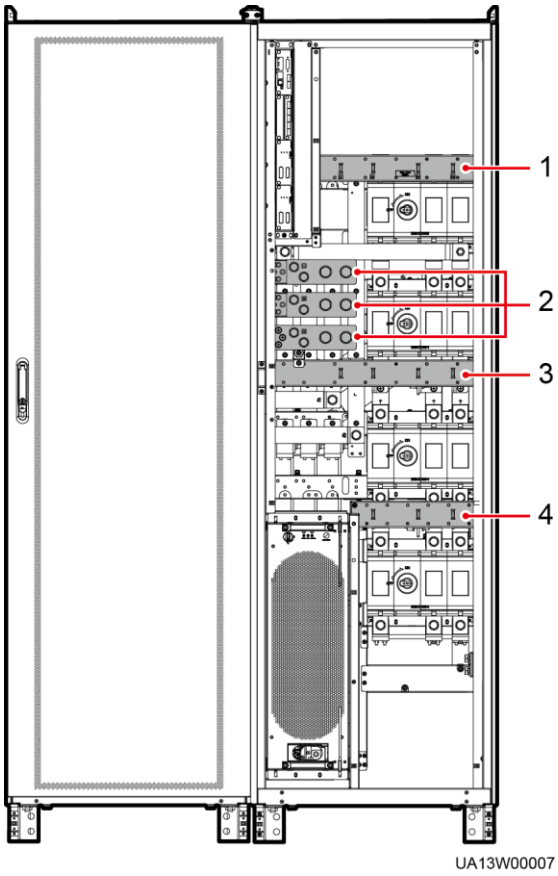
3.2.6.1 Top Cable Routing

Context

NOTICE

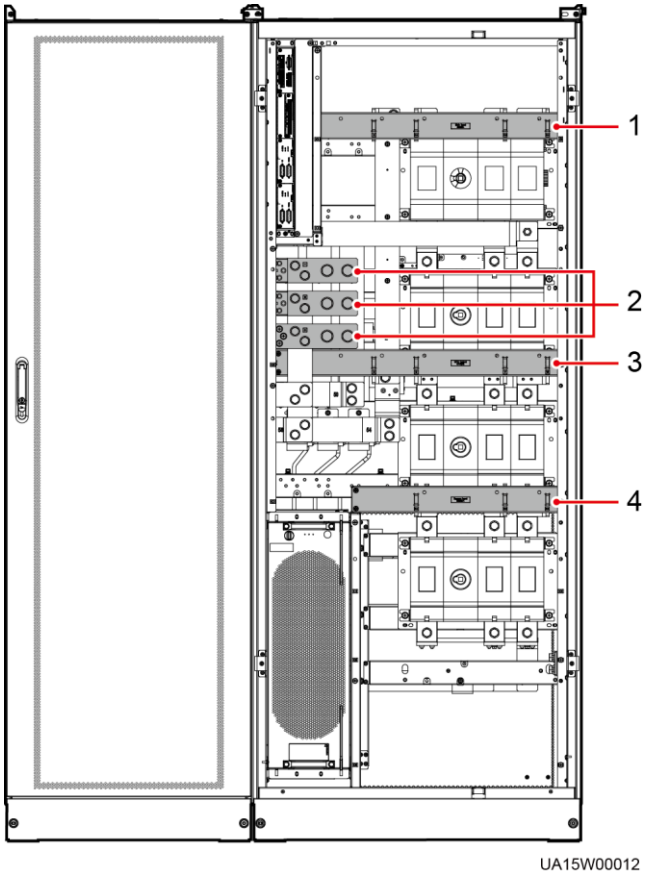
- Route cables through holes, remove the power cable cover, spare power cable cover and battery cable cover and drill holes. After you drill holes, paste grommet strip to the hole edge to protect cables. Reinstall the covers on the cabinet.
- This section introduces the dual mains scenario. If single mains is used, you do not need to remove the copper bars between the mains and bypass input terminals or connect the bypass input cable.
- Cables are connected in the same way for the 400 kVA, 500 kVA, and 600 kVA UPS. This section describes how to connect cables for the 400 kVA UPS.

Figure 3-49 Power distribution module (400 kVA UPS, 500 kVA UPS)



(1) Mains input terminal
(2) Battery input terminal
(3) Output terminal
(4) Bypass input terminal

Figure 3-50 Power distribution module (600 kVA UPS)

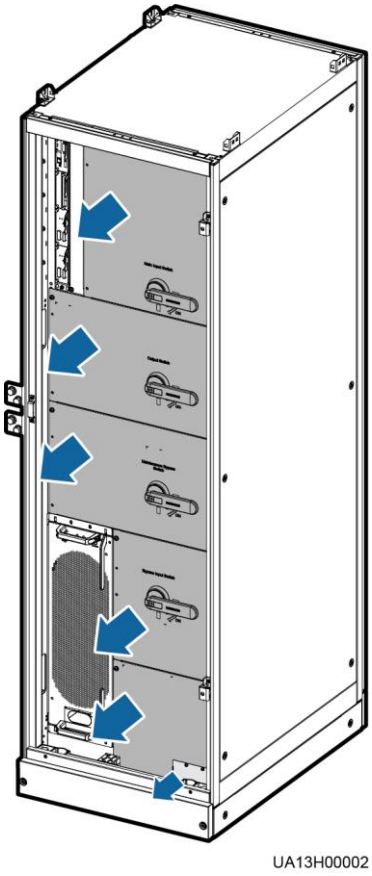


(1) Mains input terminal
(2) Battery input terminal
(3) Output terminal
(4) Bypass input terminal

Procedure

Step 1 Open the front door of the bypass cabinet and remove the covers of the power distribution subrack, as shown in Figure 3-51.

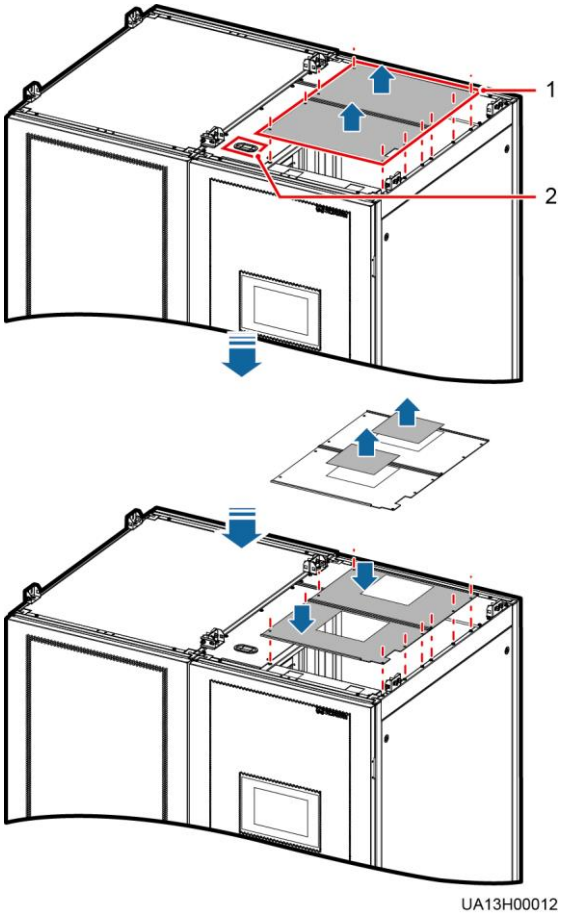
Figure 3-51 Removing the covers of the power distribution subrack



Step 2 Remove the covers from the top of the cabinet, drill holes in the covers for the power cables and battery cables, attach grommet strips to the hole edges for protecting cables, and reinstall the covers.

NOTE
The hole diameter and quantity are for reference only.

Figure 3-52 Removing the top cable covers and drilling holes



(1) Power cable covers (2) Signal cable hole

Step 3 Remove the rear cover from the bypass cabinet.

NOTE
You are advised to remove the side panel from the bypass cabinet before connecting cables.

Step 4 Remove the copper bars between the mains and bypass input wiring terminals. (Perform this step only when the mains input and bypass input use different power sources.)

NOTE
- Properly keep the removed copper bars and bolts.
- (Optional) If copper bar protective covers are installed for the bypass cabinet, remove the protective covers and then the connecting copper bars. The protective covers need to be reinstalled after the connecting copper bars are removed.

Figure 3-53 Removing the copper bar protective covers at the rear

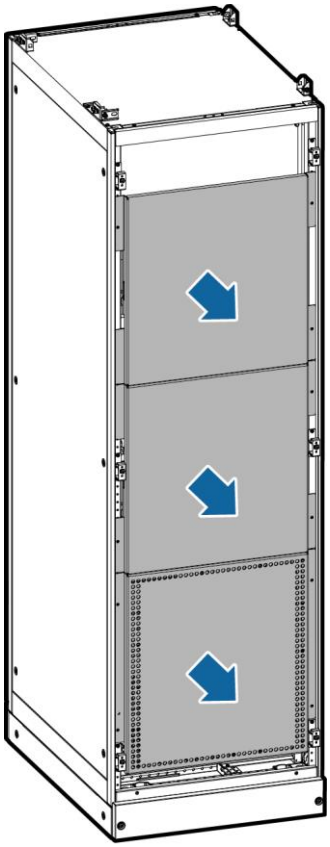
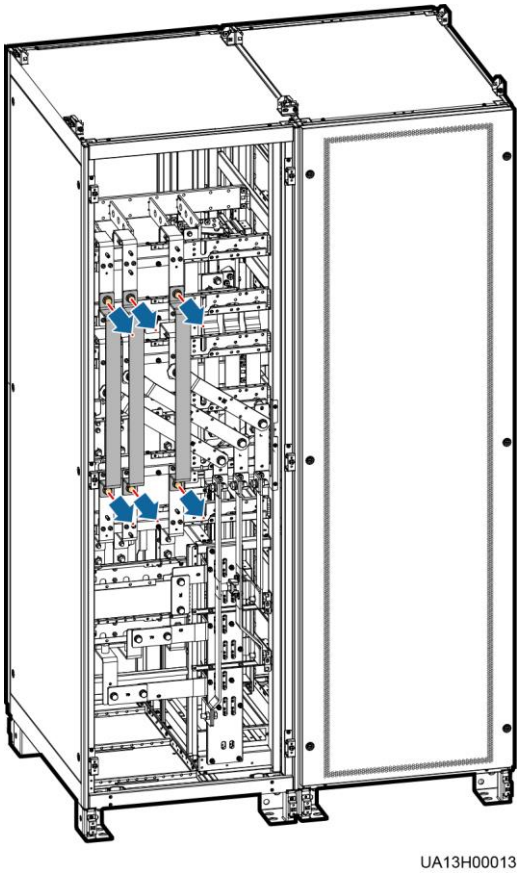


Figure 3-54 Removing the connecting copper bars



Step 5 Connect a ground cable to the UPS.

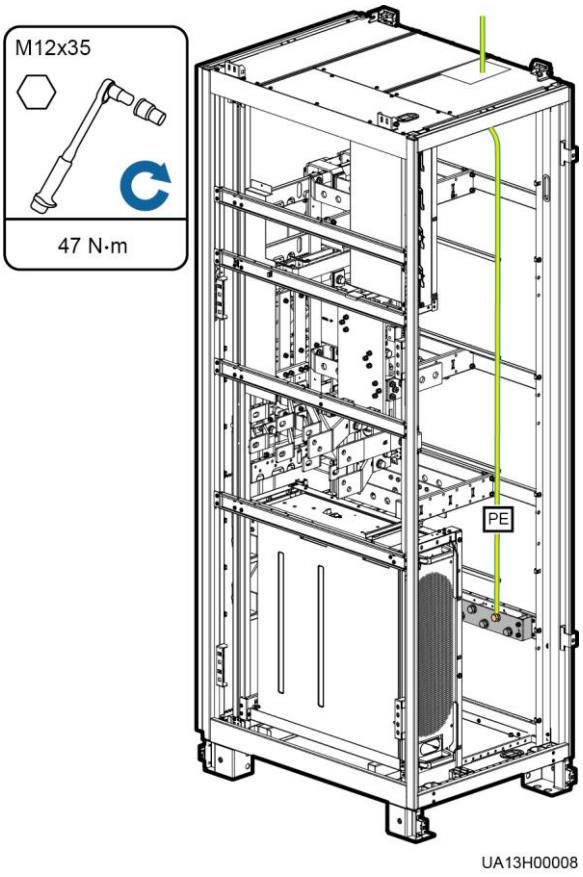
CAUTION

If you do not ground the UPS as required, electromagnetic interference, electric shocks, or fire may occur.

NOTICE

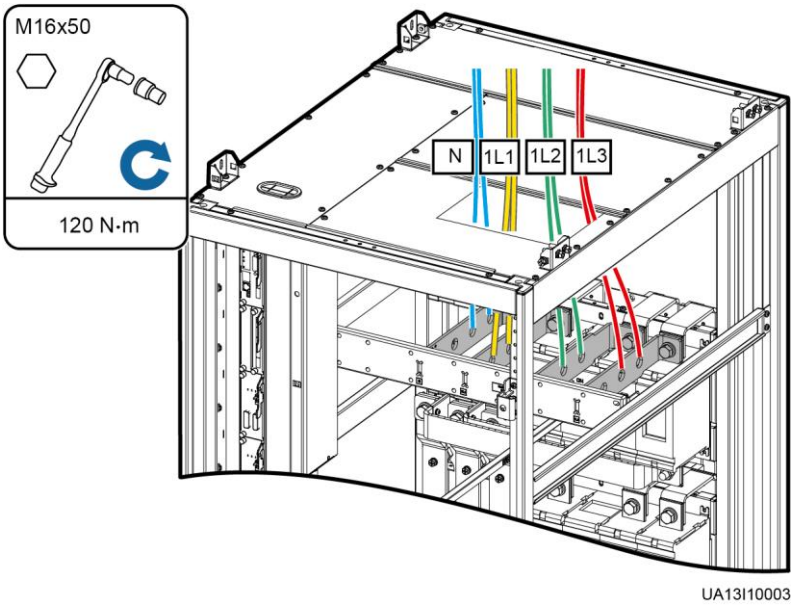
- Connect cables from top to bottom in this sequence: mains input power cables, output power cables, bypass input power cables, and battery input cables.
- When connecting cables, tighten bolts from inside out to secure cables.
- Before cable connections, ensure that all UPS input switches are OFF. Paste warning labels to prevent operation on the switches.
- Connect input power cables to the UPS and then to customer equipment.

Figure 3-55 Ground cable



Step 6 Connect the mains input power cables.

Figure 3-56 Connecting the mains input power cables

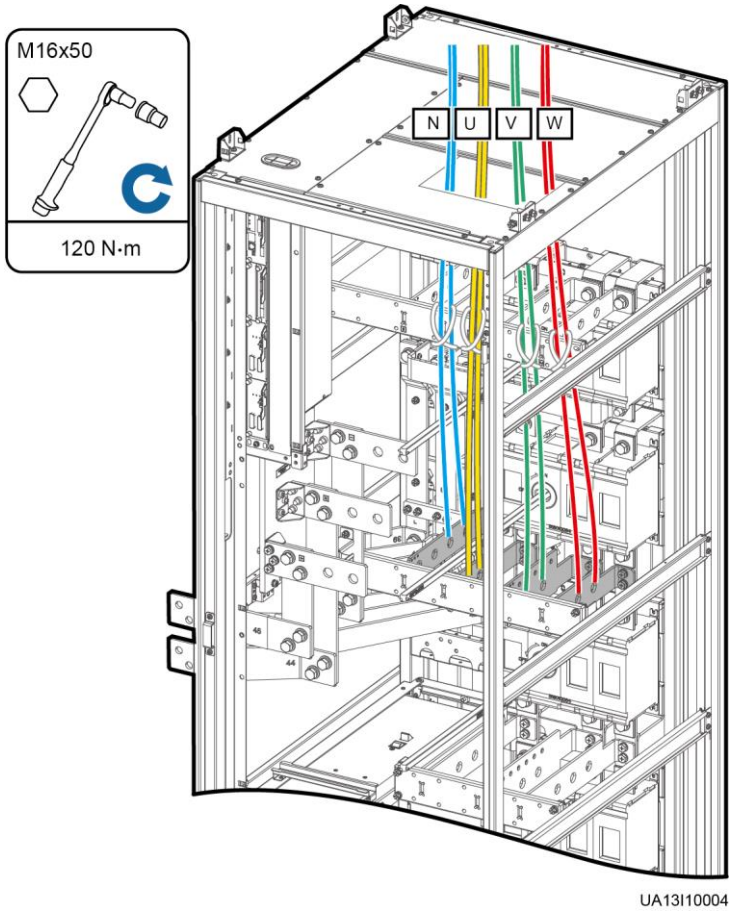


Step 7 Connect the output power cables.

CAUTION

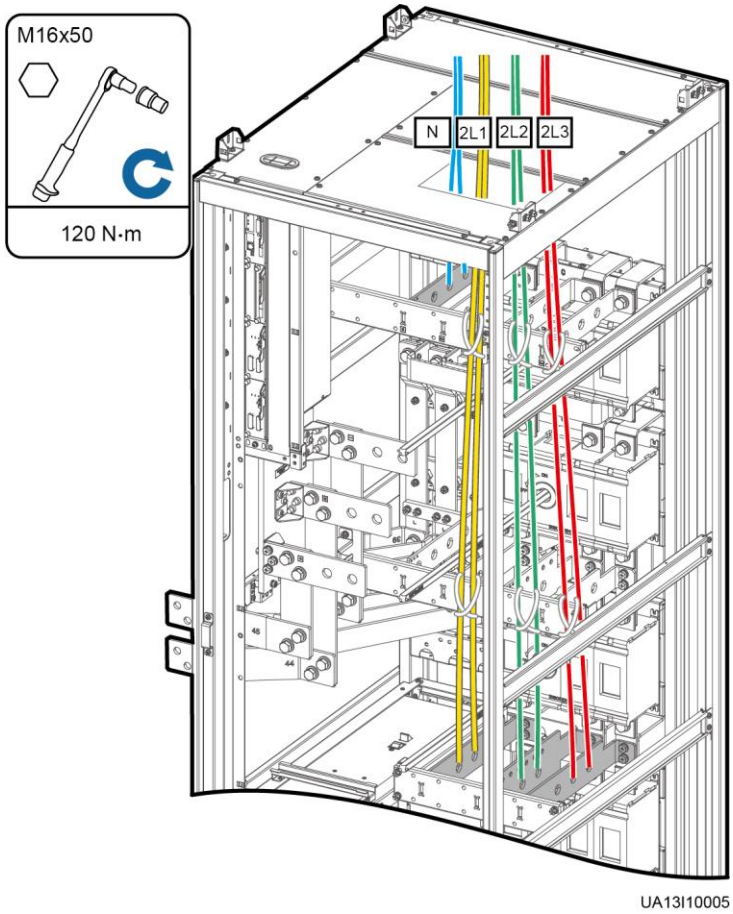
After you connect output power cables, if loads are not ready to be powered, insulate the end of the system output power cable.

Figure 3-57 Connecting AC output power cables



Step 8 Connect the bypass input power cables. (Perform this step only when the mains input and bypass input use different power sources.)

Figure 3-58 Connecting the bypass input power cables

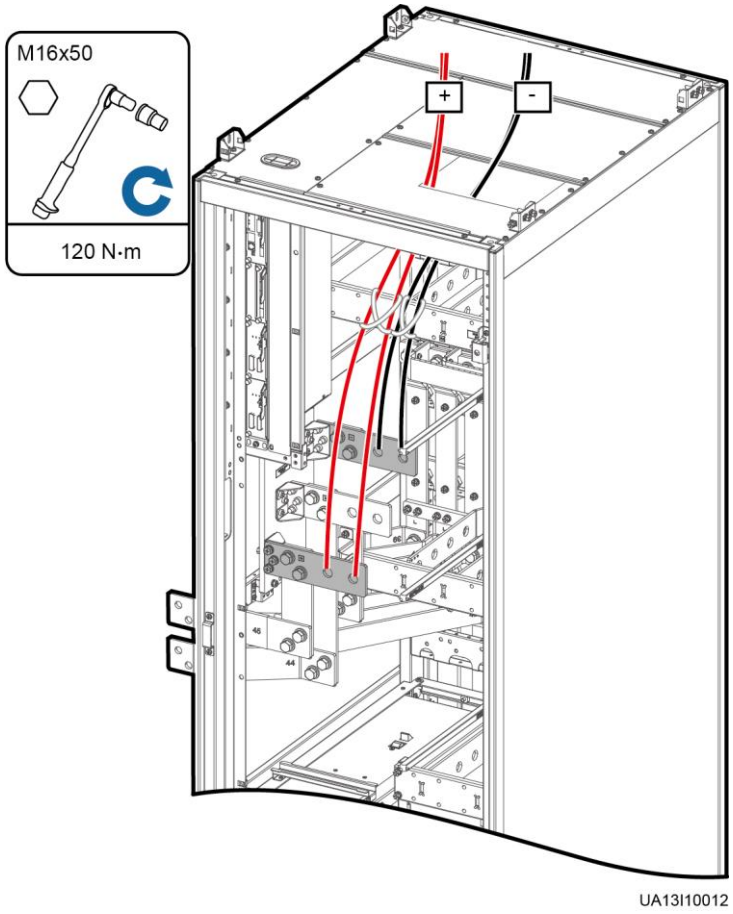


Step 9 Connect the battery cables.

DANGER

- The battery voltage may result in serious injury. Observe safety precautions when connecting cables.
- Ensure that cables are correctly connected between battery strings and the battery switch, and between the battery switch and the UPS. Avoid inverse connections.

Figure 3-59 Connecting battery cables

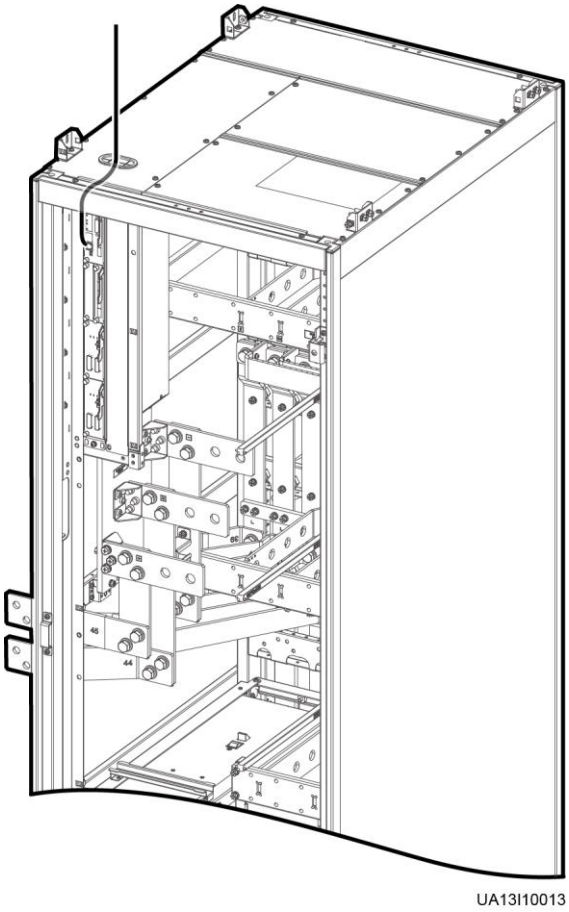


Step 10 Route signal cables. Bind cables to the cabinet. Figure 3-60 shows the signal cables routed from the top of the cabinet.

NOTICE

Bind signal cables and power cables separately.

Figure 3-60 Routing signal cables from the top of the cabinet



NOTE

The number and colors of signal cables in Figure 3-60 are for reference only.

----End

Follow-up Procedure

- After connecting cables, reinstall the covers of the power distribution subrack, rear panel, and side panel of the bypass cabinet.
- After connecting cables, check that a certain clearance is reserved between the internal switch (if any) extension pole and power cables to avoid friction.

3.2.6.2 Bottom Cable Routing

Context

NOTICE

- If you choose to route cables from the bottom of the cabinet, ensure sufficient space at the bottom of the cabinet.
- If cables need to be routed through holes, remove cable covers for power cables from the bypass cabinet and drill holes in the covers. After drilling holes, attach grommet strips on the hole edges for protecting cables. Reinstall the covers on the cabinet.
- This section describes cable connections when the mains input and bypass input use different power sources. When they use the same power source, there is no need to remove the copper bars between the mains and bypass input terminals or connect the bypass input power cable.
- Cables are connected in the same way for the 400 kVA, 500 kVA, and 600 kVA UPS. This section describes how to connect cables for the 400 kVA UPS.

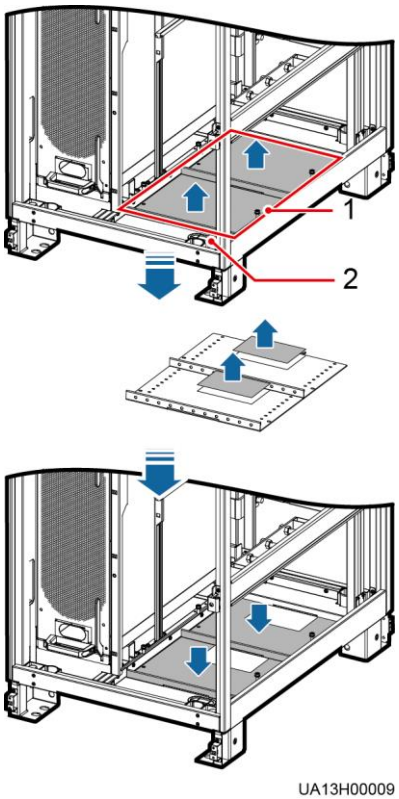
Procedure

Step 1 Open the front door of the bypass cabinet, and remove the covers of the power distribution subrack from the bypass cabinet.

Step 2 Remove the cable covers from the bottom of the cabinet, drill holes in the covers, attach grommet strips to the hole edges for protecting cables, and reinstall the cable covers.

NOTE
The hole size and quantity are for reference only.

Figure 3-61 Removing the bottom cable covers and drilling holes



(1) Power cable covers (2) Signal cable hole

Step 3 Remove the rear cover from the bypass cabinet.

NOTE

You are advised to remove the side panel from the bypass cabinet before connecting cables.

Step 4 Remove the copper bars between the mains and bypass input wiring terminals. (Perform this step only when the mains input and bypass input use different power sources.)

NOTE

- Properly keep the removed copper bars and bolts.
- (Optional) If copper bar protective covers are installed for the bypass cabinet, remove the protective covers and then the connecting copper bars. The protective covers need to be reinstalled after the connecting copper bars are removed.

Step 5 Connect a ground cable to the UPS.

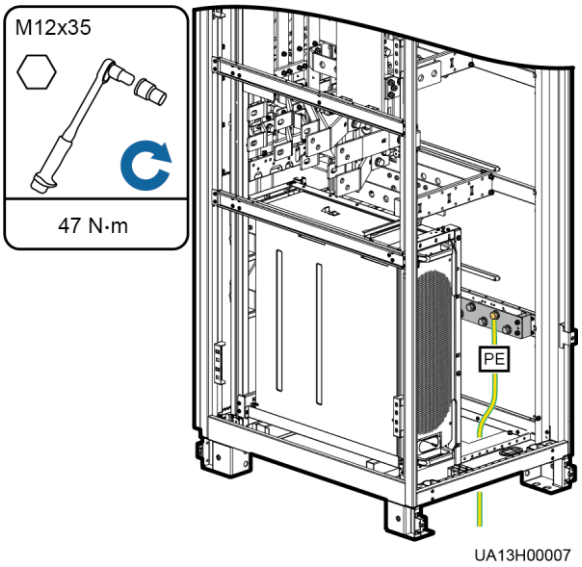
CAUTION

If you do not ground the UPS as required, electromagnetic interference, electric shocks, or fire may occur.

NOTICE

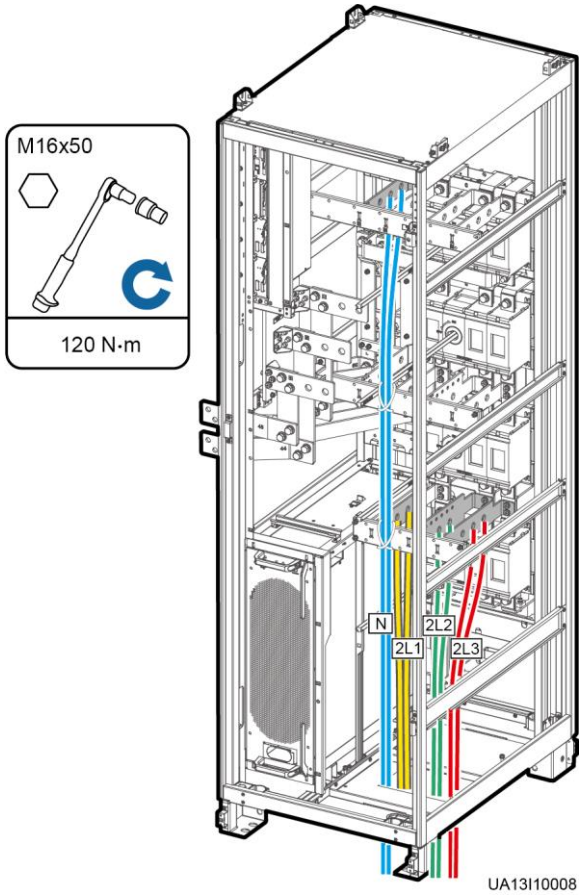
- Connect cables from bottom up in this sequence: bypass input power cables, output power cables, mains input power cables, and battery input power cables.
- When connecting cables, tighten bolts from inside out to secure cables.
- Before connecting cables, ensure that all UPS input switches are turned off. Paste warning labels to prevent others from operating the switches.
- Connect the input power cables to the UPS before connecting power cables to customer equipment.

Figure 3-62 Grounding



Step 6 Connect the bypass input power cables. (Perform this step only when the mains input and bypass input use different power sources.)

Figure 3-63 Connecting the bypass input power cables

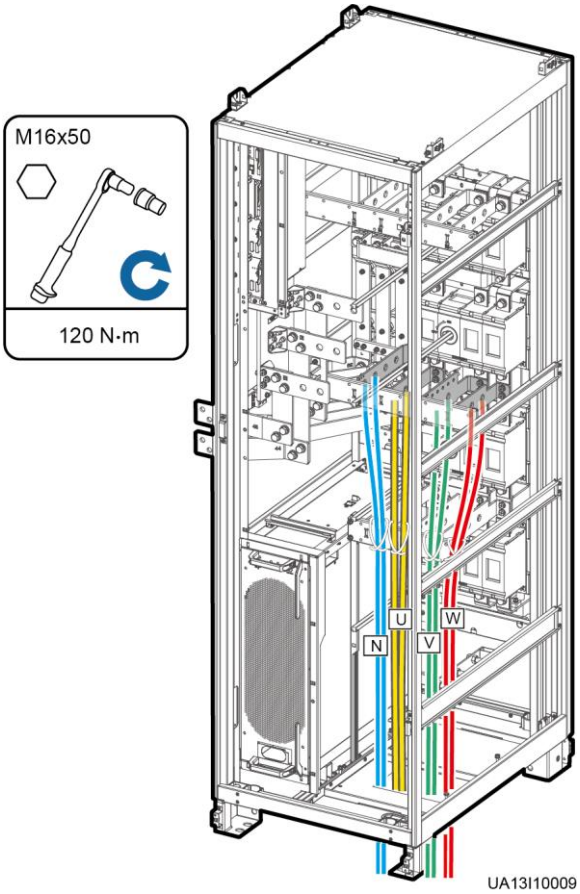


Step 7 Connect the output power cables.

CAUTION

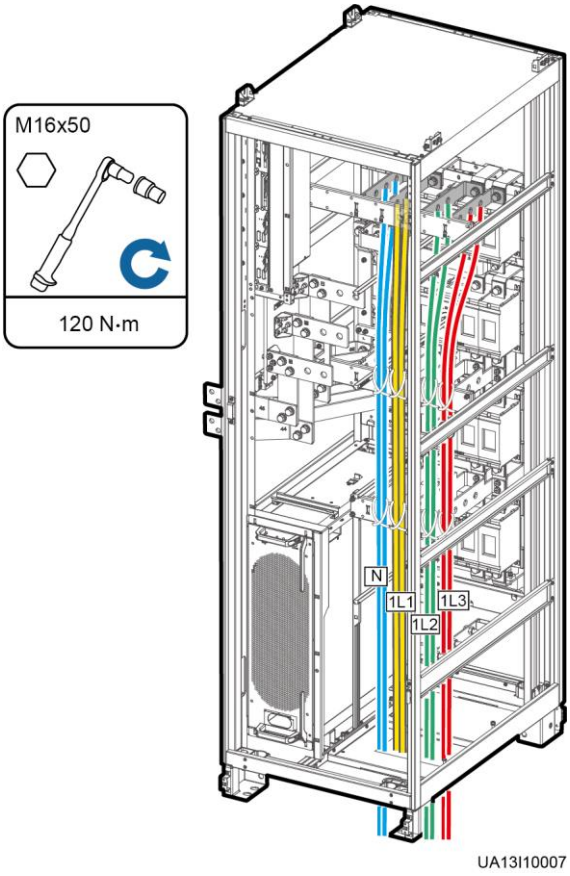
After connecting the output power cables, if loads are not ready to be powered, insulate the terminals of the output power cables.

Figure 3-64 Connecting output power cables



Step 8 Connect the mains input power cables.

Figure 3-65 Connecting the mains input power cables

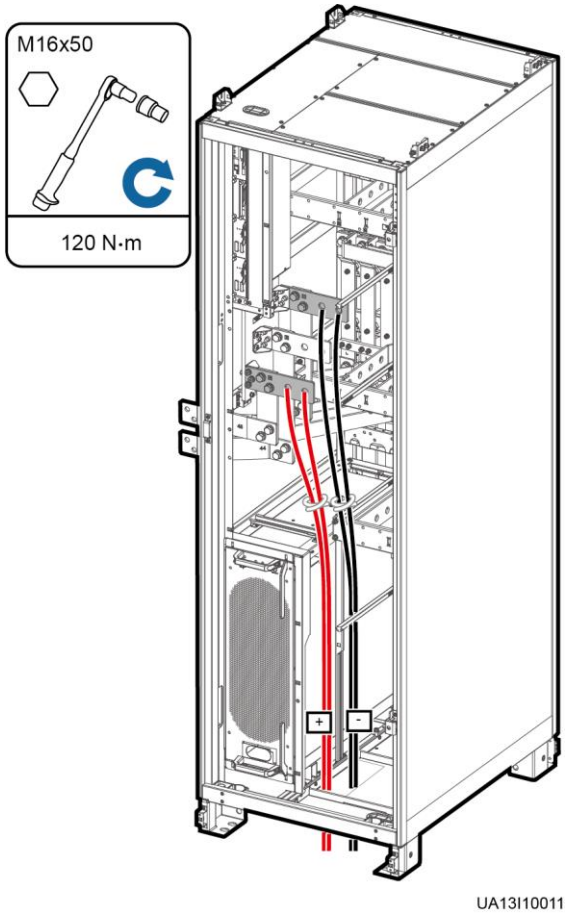


Step 9 Connect the battery cables.

DANGER

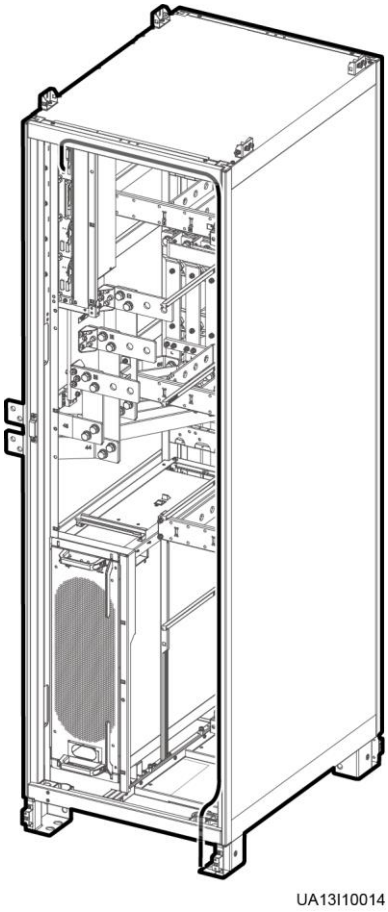
- The battery voltage may result in serious injury. Observe safety precautions when connecting cables.
- Ensure that cables are correctly connected between battery strings and the battery switch, and between the battery switch and the UPS. Avoid inverse connections.

Figure 3-66 Connecting battery cables



Step 10 Route signal cables. Bind cables to the cabinet. Figure 3-67 shows the signal cables routed from the bottom of the cabinet.

Figure 3-67 Signal cables routed from the bottom



NOTE

The number and colors of signal cables in Figure 3-67 are for reference only.

----End

Follow-up Procedure

- After connecting cables, reinstall the covers of the power distribution subrack, rear panel, and side panel of the bypass cabinet.
- After connecting cables, check that a certain clearance is reserved between the internal switch (if any) extension pole and power cables to avoid friction.

3.2.7 Routing Cables (880 kVA UPS)

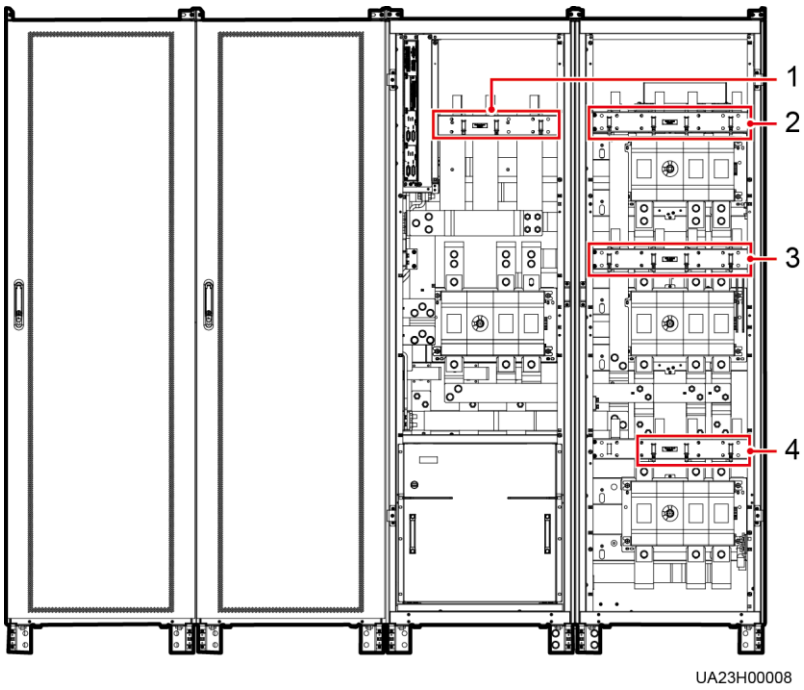
3.2.7.1 Top Cable Routing

Context

NOTICE

- Route cables for the UPS from inside out and from top down.
- This section introduces the dual mains scenario. If single mains is used, you do not need to remove the copper bars between the mains and bypass input terminals or connect the bypass input cable.

Figure 3-68 Power distribution module



(1) Battery input terminal
(2) Mains input terminal
(3) Output terminal
(4) Bypass input terminal

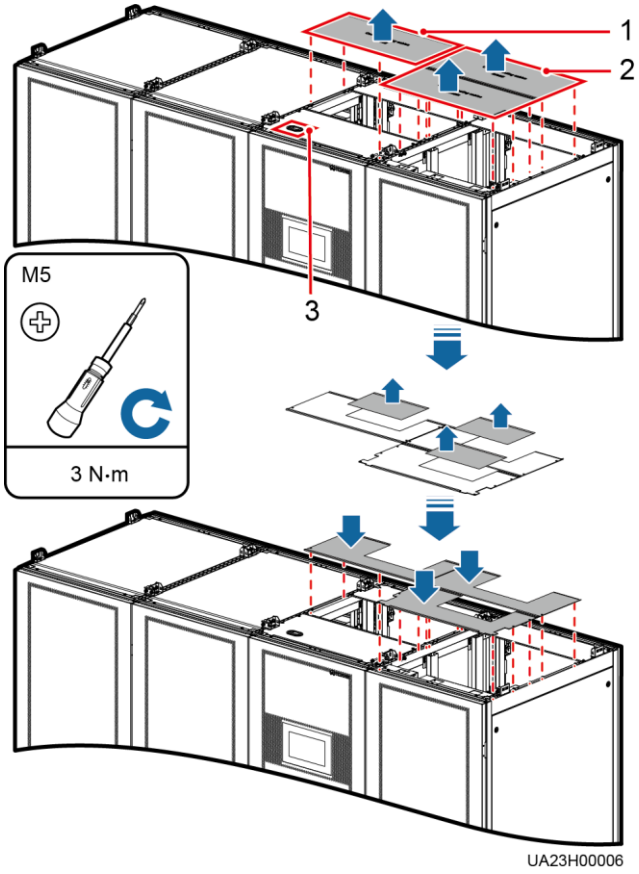
Procedure

Step 1 Open the front door of the bypass cabinet, and remove the covers of the power distribution subrack from the bypass cabinet, as shown in Figure 3-29.

Step 2 Remove the cable covers from the top of the cabinet, drill holes in the covers, attach grommet strips to the hole edges for protecting cables, and reinstall the cable covers.

NOTE
The hole size and quantity are for reference only.

Figure 3-69 Removing the top cable covers and drilling holes



(1) Battery cable cover (2) Power cable covers (3) Signal cable hole

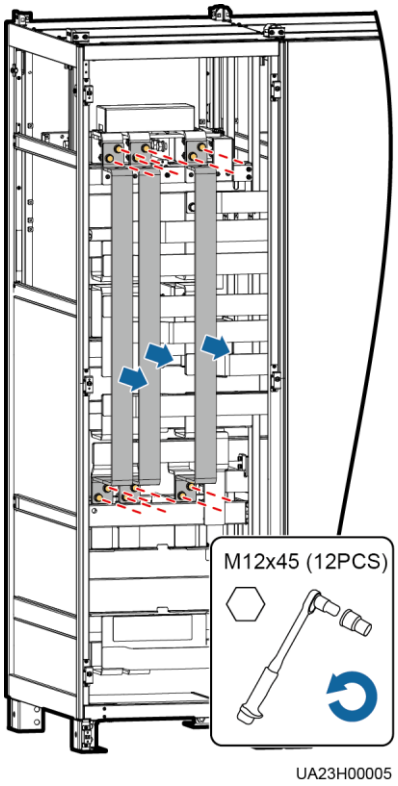
Step 3 Remove the rear cover from the bypass cabinet.

NOTE
You are advised to remove the side panel from the bypass cabinet before connecting cables.

Step 4 Remove the copper bars between the mains and bypass inputs. (Perform this step only when the mains input and bypass input use different power sources.)

NOTE
- Properly keep the removed copper bars and bolts.
- (Optional) If copper bar protective covers are installed for the bypass cabinet, remove the protective covers and then the connecting copper bars. The protective covers need to be reinstalled after the connecting copper bars are removed.

Figure 3-70 Removing the connecting copper bars

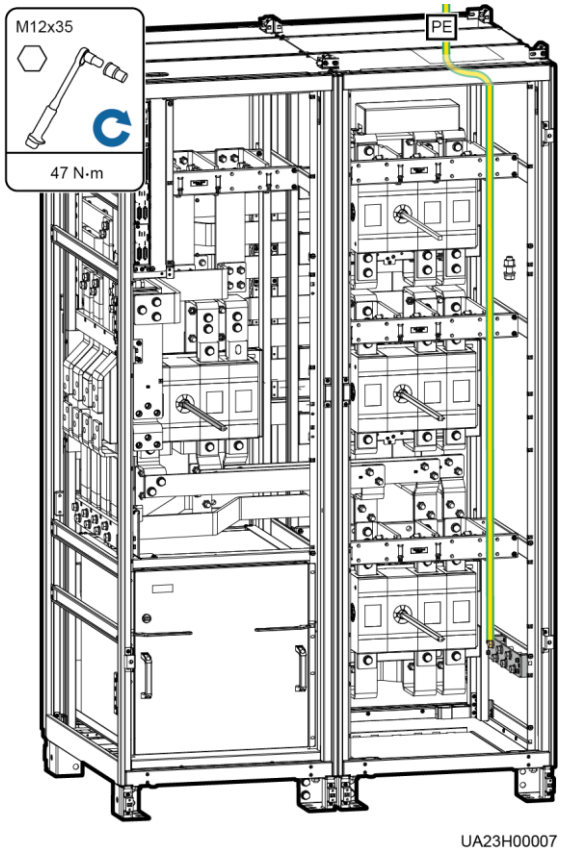


Step 5 Connect a ground cable to the UPS.

NOTICE

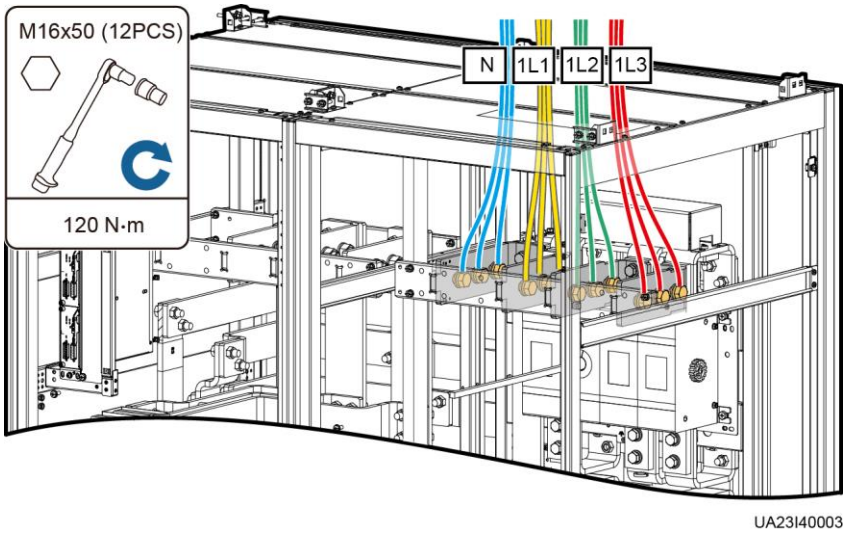
- Before connecting cables, ensure that all UPS input switches are turned off. Paste warning labels to prevent others from operating the switches.
- Connect the input power cables to the UPS before connecting power cables to customer equipment.

Figure 3-71 Grounding



Step 6 Connect the mains input power cables.

Figure 3-72 Connecting the mains input power cables

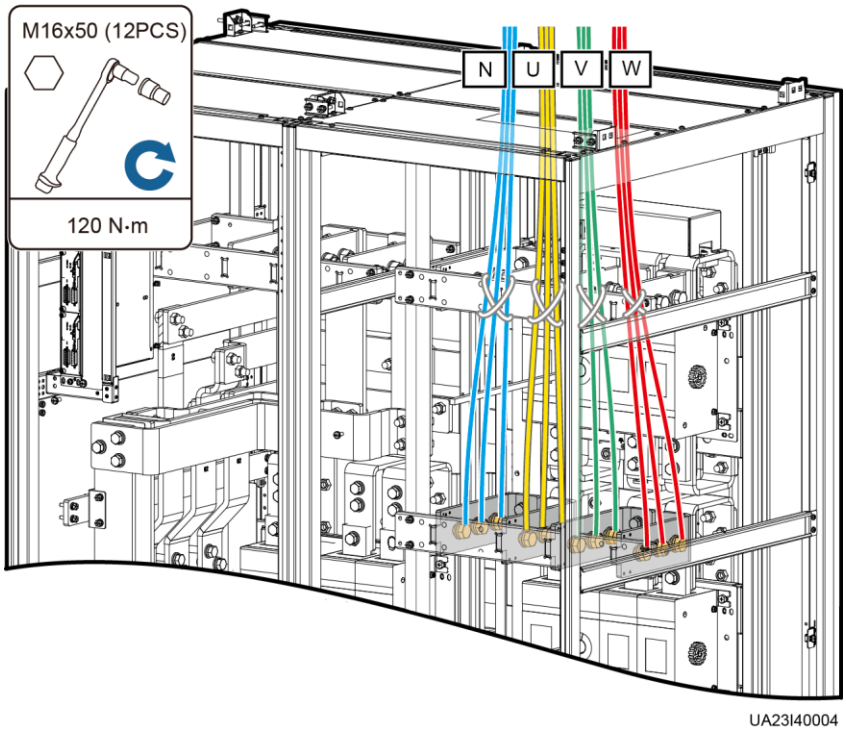


Step 7 Connect the output power cables.

CAUTION

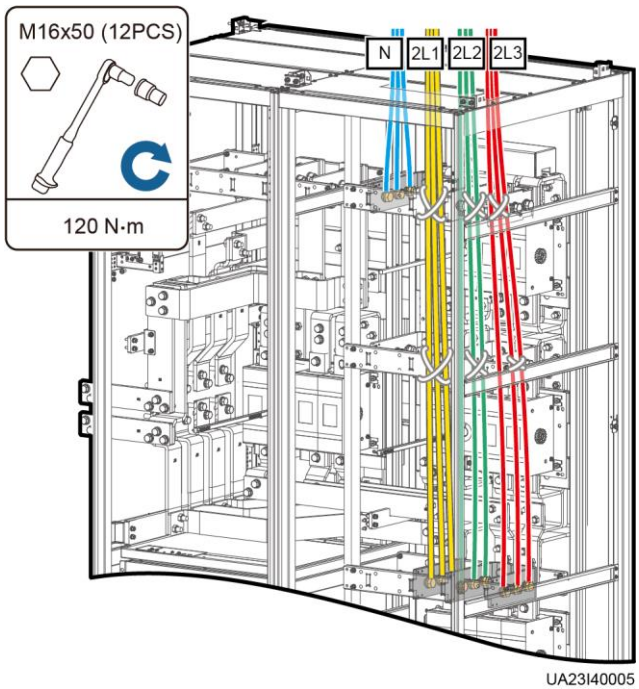
After connecting the output power cables, if loads are not ready to be powered, insulate the terminals of the output power cables.

Figure 3-73 Connecting AC output power cables



Step 8 Connect the bypass input power cables. (Perform this step only when the mains input and bypass input use different power sources.)

Figure 3-74 Connecting the bypass input power cables

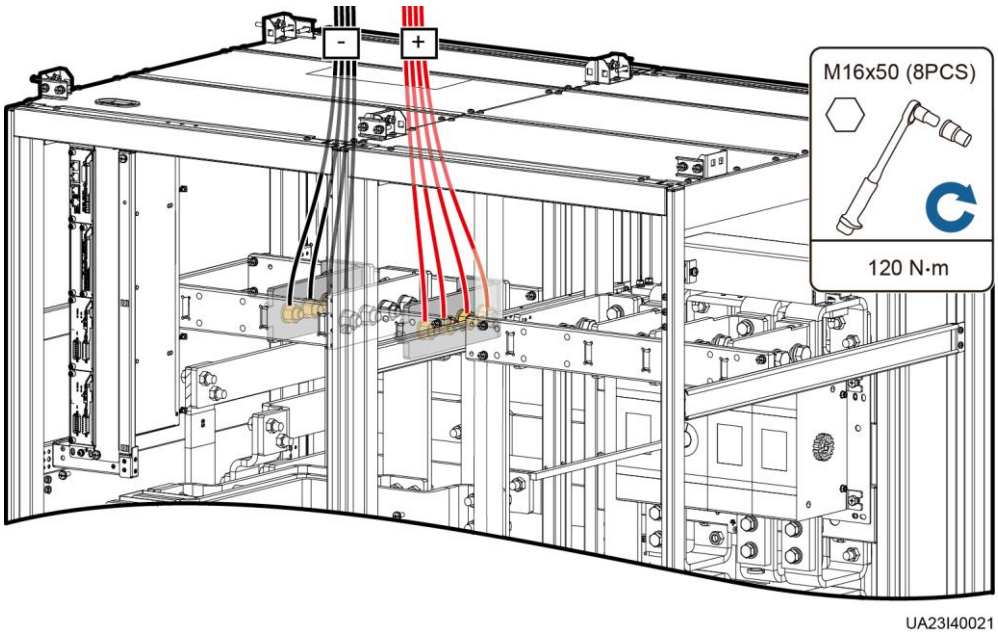


Step 9 Connect the battery cables.

DANGER

- The battery voltage may result in serious injury. Observe safety precautions when connecting cables.
- Ensure that cables are correctly connected between battery strings and the battery switch, and between the battery switch and the UPS. Avoid inverse connections.

Figure 3-75 Connecting battery cables

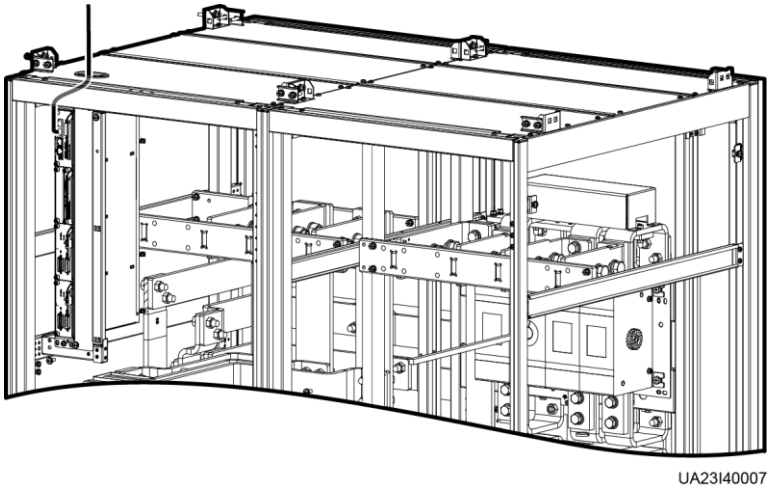


Step 10 Route signal cables. Bind cables to the cabinet. Figure 3-76 shows the signal cables routed from the top of the cabinet.

NOTICE

Do not bind signal cables and power cables together.

Figure 3-76 Routing signal cables from the top of the cabinet



NOTE

The number and colors of signal cables in Figure 3-76 are for reference only.

----End

Follow-up Procedure

- After connecting cables, reinstall the covers of the power distribution subrack, rear panel, and side panel of the bypass cabinet.
- After connecting cables, check that a certain clearance is reserved between the internal switch (if any) extension pole and power cables to avoid friction.

3.2.7.2 Bottom Cable Routing

Context

NOTICE

- Route cables for the UPS from inside out and from bottom up.
- After routing cables, use firestop putty to seal the gaps between the cables and the cabinet.

Procedure

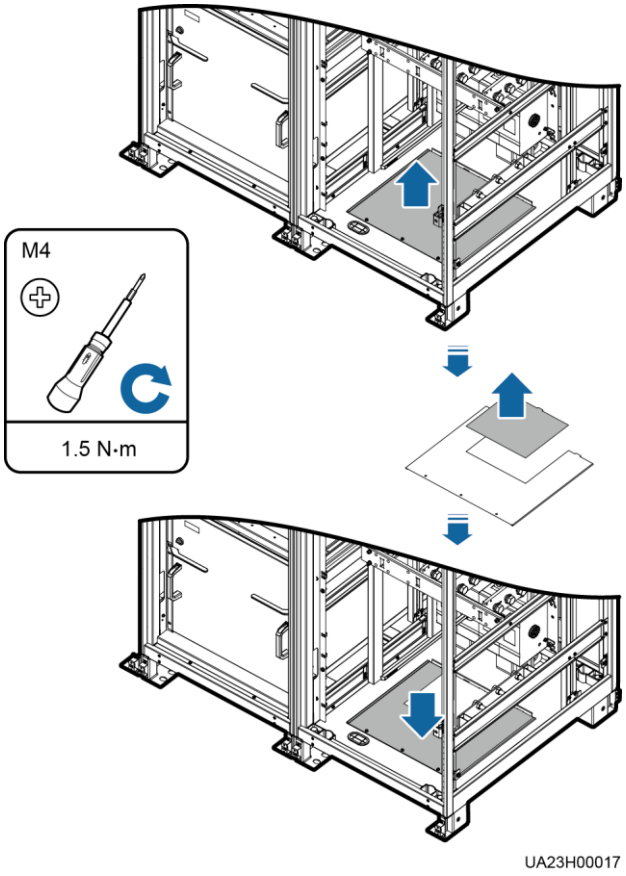
Step 1 Open the front door of the bypass cabinet, and remove the covers of the power distribution subrack from the bypass cabinet.

Step 2 Remove the cable covers from the bottom of the cabinet, drill holes in the covers, attach grommet strips to the hole edges for protecting cables, and reinstall the cable covers.

NOTE

The hole diameter and quantity are for reference only.

Figure 3-77 Removing the bottom cable covers and drilling holes



Step 3 Remove the rear cover from the bypass cabinet.

NOTE

You are advised to remove the side panel from the bypass cabinet before connecting cables.

Step 4 Remove the copper bars between the mains and bypass input wiring terminals. (Perform this step only when the mains input and bypass input use different power sources.)

NOTE

- Properly keep the removed copper bars and bolts.
- (Optional) If copper bar protective covers are installed for the bypass cabinet, remove the protective covers and then the connecting copper bars. The protective covers need to be reinstalled after the connecting copper bars are removed.

Step 5 Connect a ground cable to the UPS.

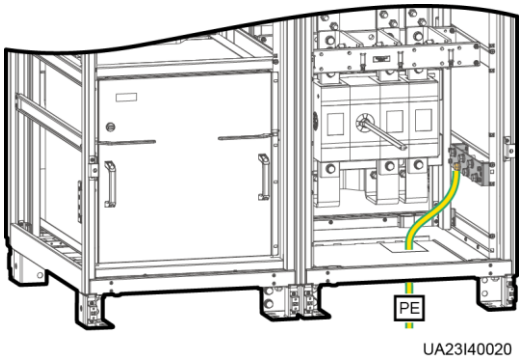
CAUTION

If you do not ground the UPS as required, electromagnetic interference, electric shocks, or fire may occur.

NOTICE

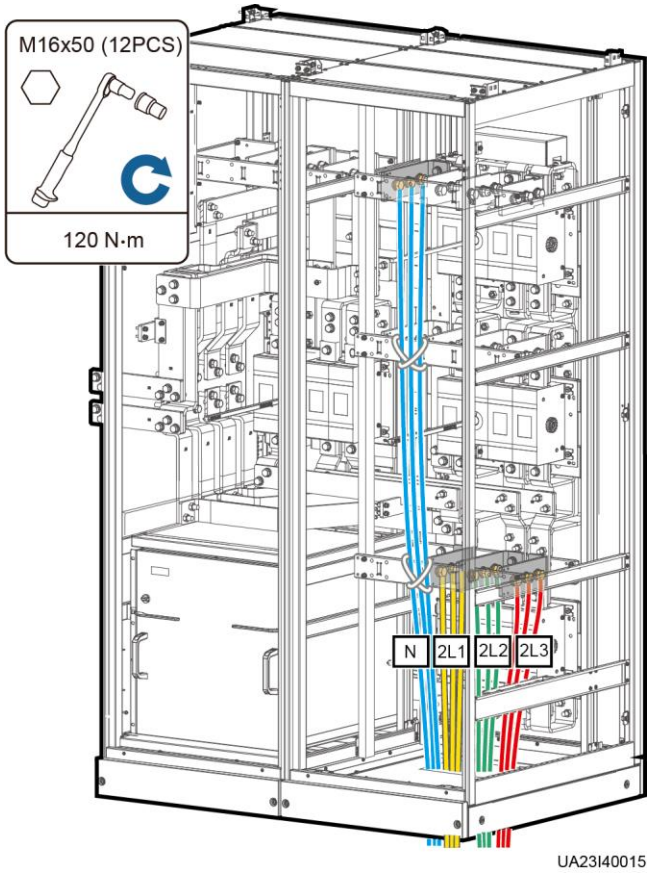
- Before connecting cables, ensure that all UPS input switches are turned off. Paste warning labels to prevent others from operating the switches.
- Connect the input power cables to the UPS before connecting power cables to customer equipment.

Figure 3-78 Grounding



Step 6 Connect the bypass input power cables. (Perform this step only when the mains input and bypass input use different power sources.)

Figure 3-79 Connecting the bypass input power cables

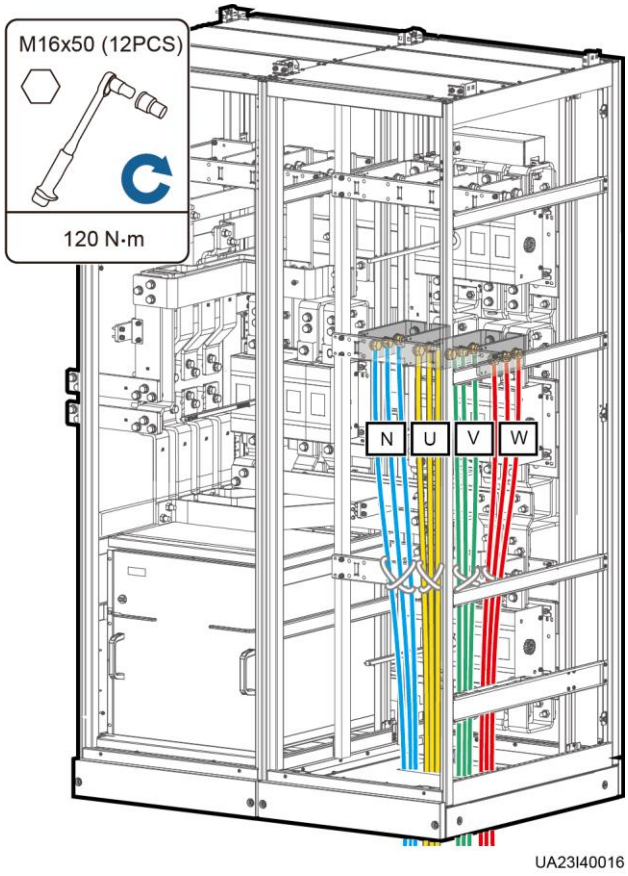


Step 7 Connect the output power cables.

CAUTION

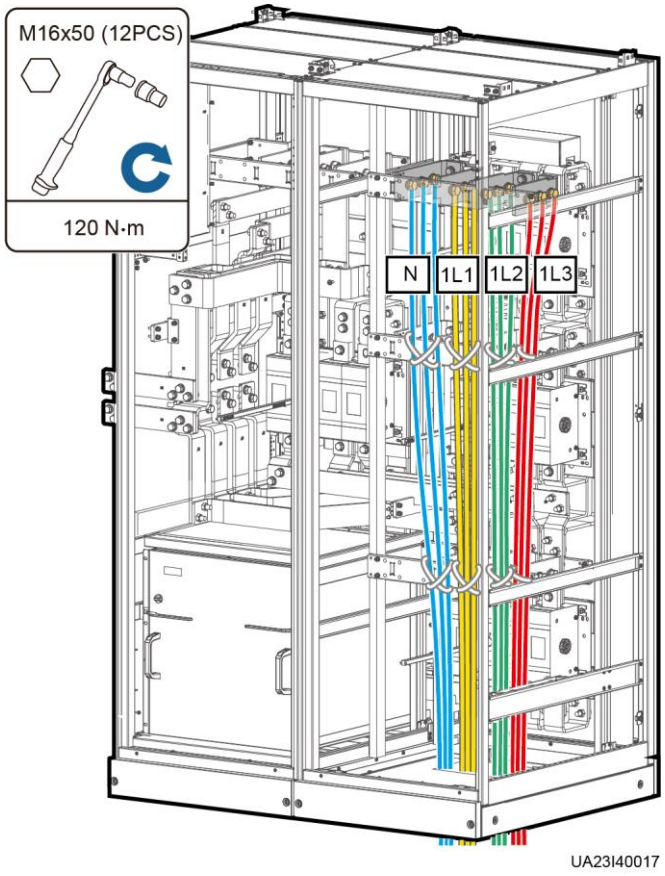
After connecting the output power cables, if loads are not ready to be powered, insulate the terminals of the output power cables.

Figure 3-80 Connecting the output power cables



Step 8 Connect the mains input power cables.

Figure 3-81 Connecting the mains input power cables

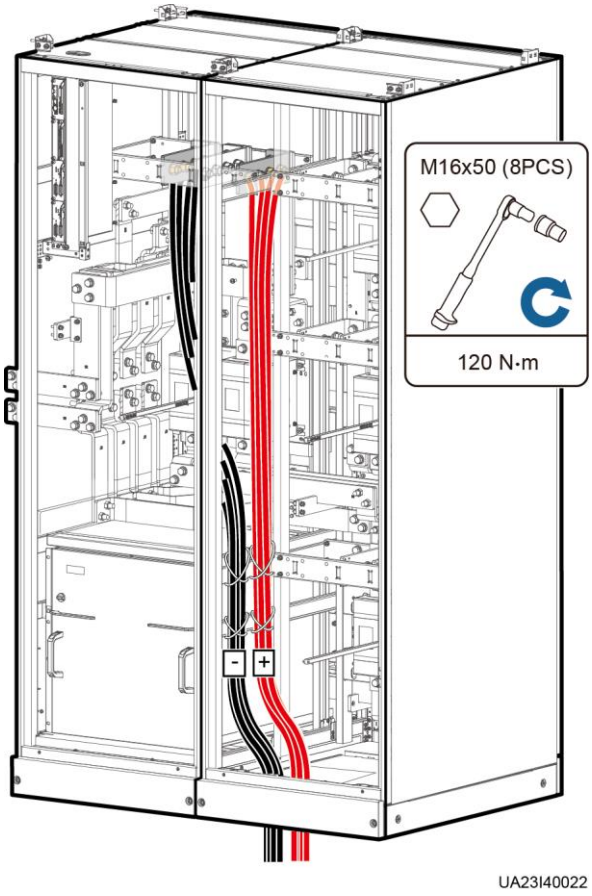


Step 9 Connect the battery cables.

DANGER

- The battery voltage may result in serious injury. Observe safety precautions when connecting cables.
- Ensure that cables are correctly connected between battery strings and the battery switch, and between the battery switch and the UPS. Avoid inverse connections.

Figure 3-82 Connecting the battery cables

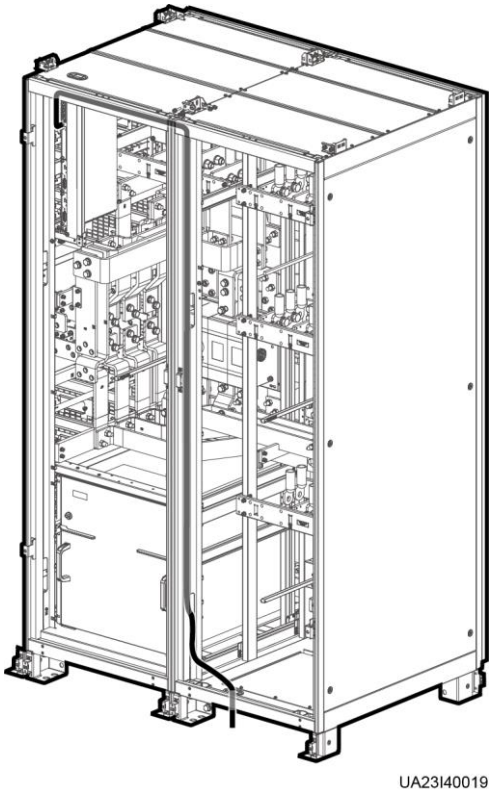


Step 10 Route signal cables. Bind cables to the cabinet. Figure 3-83 shows the signal cables routed from the bottom of the cabinet.

NOTICE

Do not bind signal cables and power cables together.

Figure 3-83 Signal cables routed from the bottom



----End

Follow-up Procedure

- After connecting cables, reinstall the covers of the power distribution subrack, rear panel, and side panel of the bypass cabinet.
- After connecting cables, check that a certain clearance is reserved between the internal switch (if any) extension pole and power cables to avoid friction.

3.2.8 Remote EPO

NOTICE

- Huawei does not provide the EPO switch or cable. If the cable is required, the recommended cable is 22 AWG.
- Equip the EPO switch with a protective cover to prevent misoperations, and cover the cable with protective tubing.
- Triggering EPO will shut down the rectifier, inverter, charger, and static bypass, but does not disconnect the UPS mains input. To power off the UPS completely, open the front-end input switch when triggering EPO.

Connect the requisite EPO switch to UPS dry contacts.

- Figure 3-84 shows the cable connections for an NC EPO switch.
- Figure 3-85 shows the cable connections for an NO EPO switch.

Figure 3-84 Cable connection for an NC EPO switch

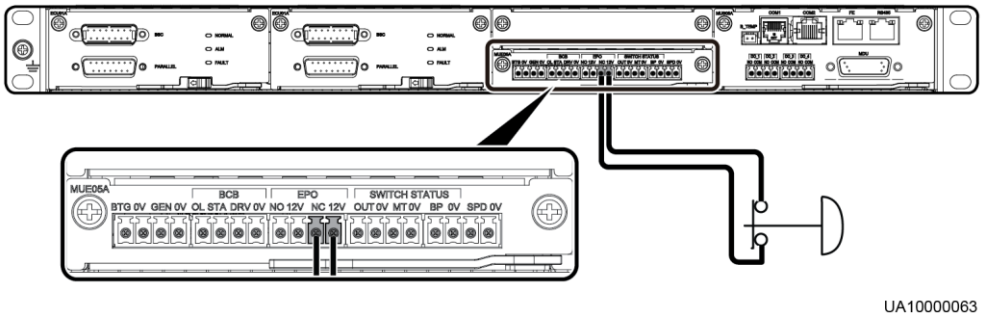
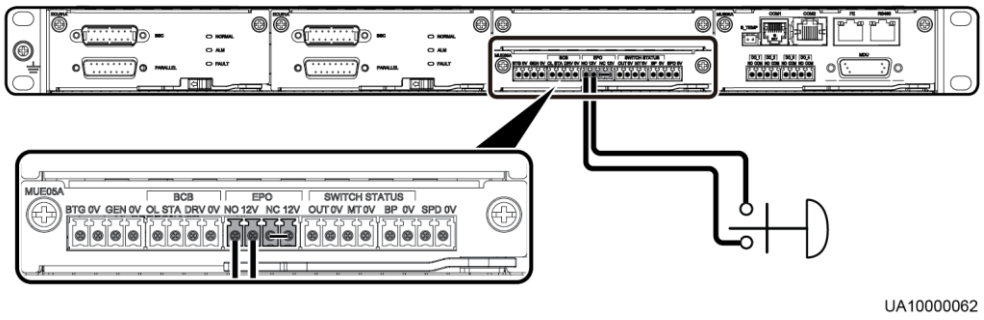


Figure 3-85 Cable connection for an NO EPO switch



NOTE

- When the EPO switch is in the NC state, remove the jumper between EPO_NC and EPO_12V before connection. When the EPO switch is turned off, EPO is triggered.
- When the EPO switch is in the NO state, ensure that the jumper is connected between EPO_NC and EPO_12V. When the EPO switch is turned on, EPO is triggered.

3.2.9 Connecting Communications Cables

Procedure

Step 1 Connect the external network management device to the RS485 port.

Step 2 Connect the network port on a PC to the FE port.

----End

3.3 Parallel System Installation

3.3.1 Connecting Power Cables

Context

NOTE

Power cables are connected in the same way for the 400 kVA, 500 kVA, and 600 kVA UPSs. This section describes how to connect power cables for the 400 kVA UPS.

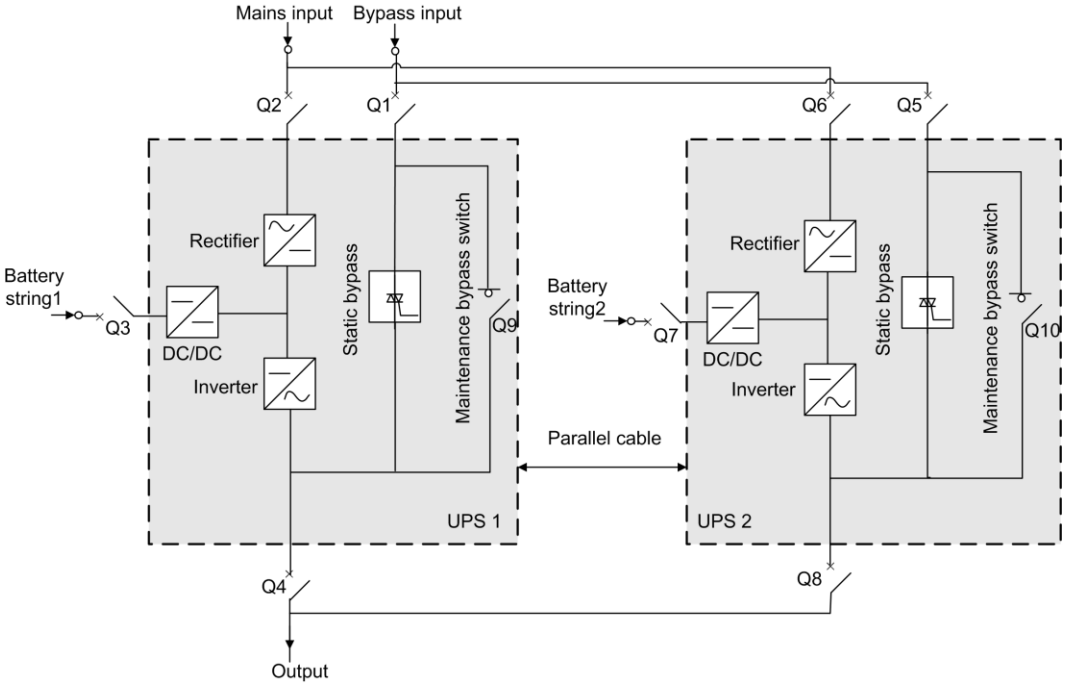
Procedure

Step 1 Ground each UPS in a parallel system separately, and connect power cables and battery cables.

Step 2 Choose a parallel mode and connect cables to the parallel system based on site requirements.

Figure 3-86, Figure 3-87, and Figure 3-88 show the typical conceptual diagram and cable connections for a 1+1 parallel system.

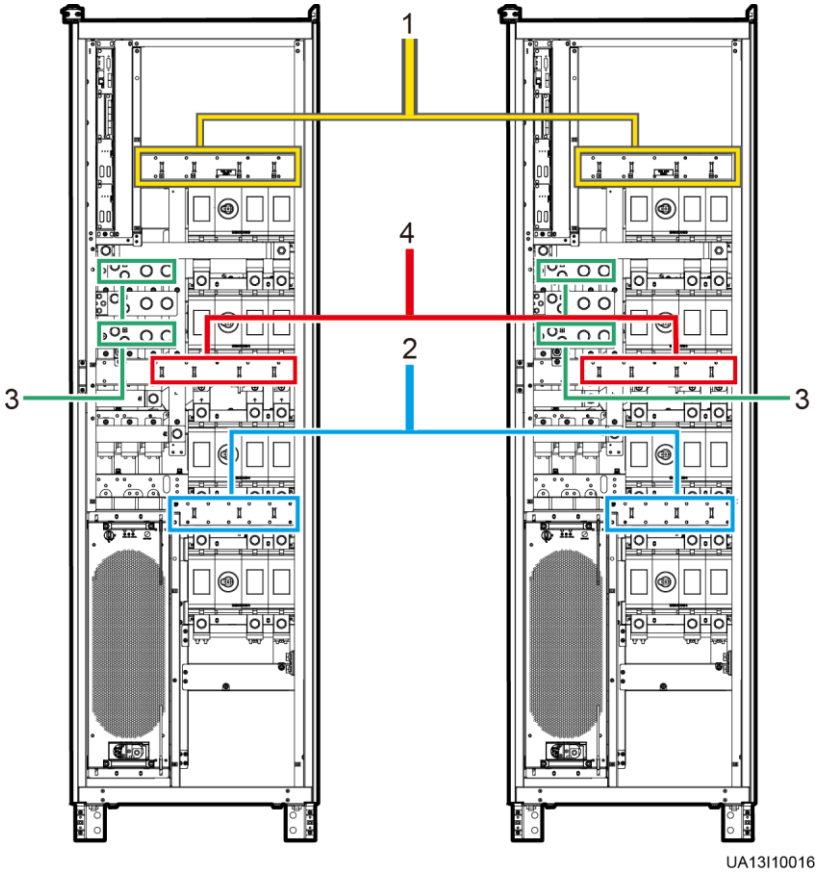
Figure 3-86 Conceptual diagram of a 1+1 parallel system



NOTICE

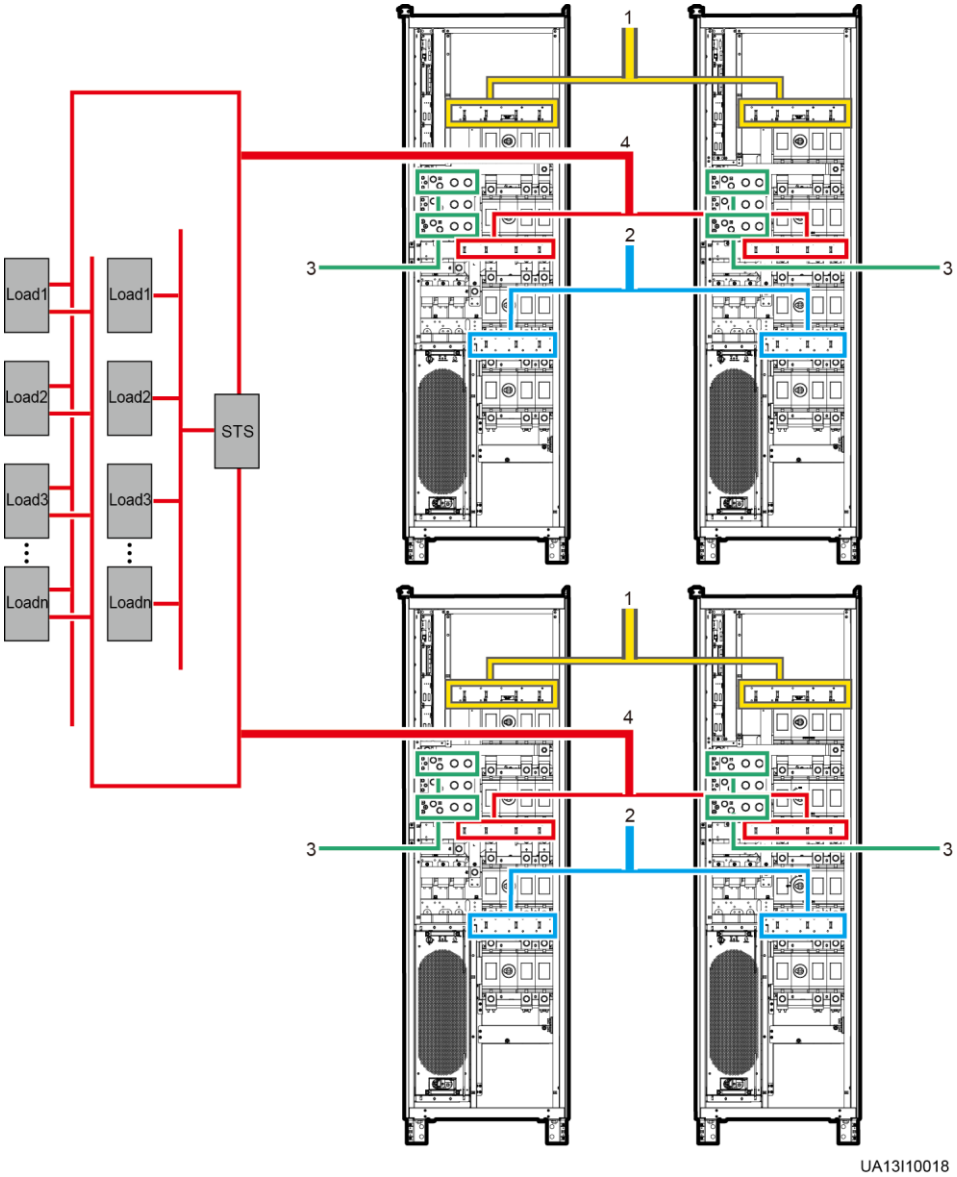
Connect power cables according to port silk screen.

Figure 3-87 Cable connections for a 1+1 parallel system (400 kVA UPS)



(1) Mains input power cables (2) Bypass input power cables (3) Battery cables (4) Output power cables

Figure 3-88 Cable connections for a 1+1 parallel system (880 kVA UPS)



(1) Mains input power cables
(2) Bypass input power cables
(3) Battery cables
(4) Output power cables

Figure 3-89, Figure 3-90, and Figure 3-91 show the conceptual diagram and cable connections for a bus system consisting of two UPSs.

NOTICE

The length and specifications of power cables on each UPS must be the same to achieve current equalization in bypass mode. The power cables include bypass input power cables and UPS output power cables.

Figure 3-89 Conceptual diagram of a dual-bus system

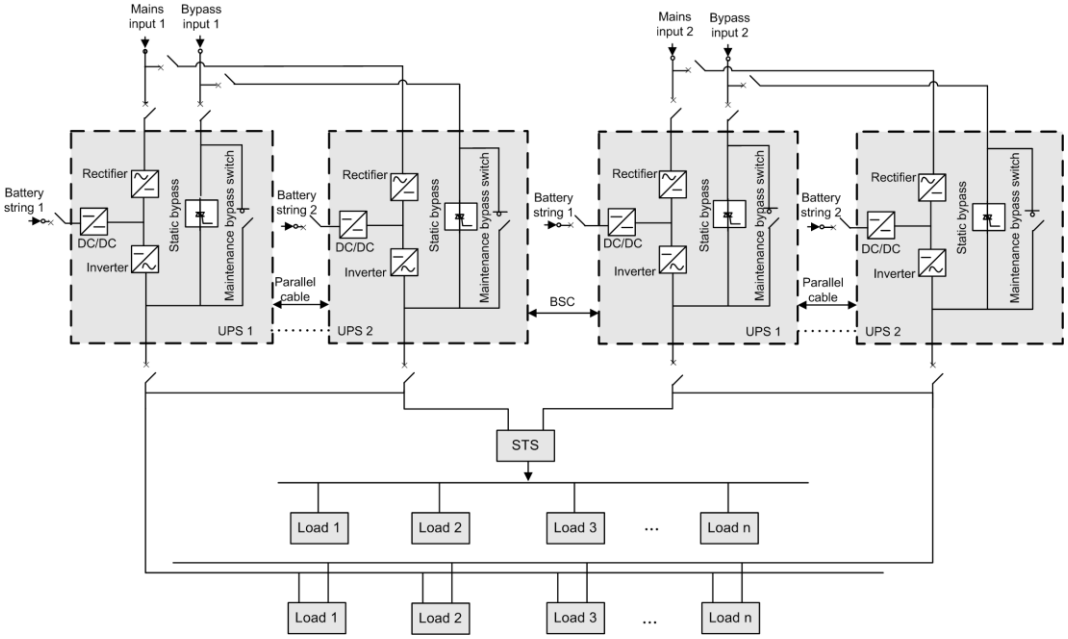
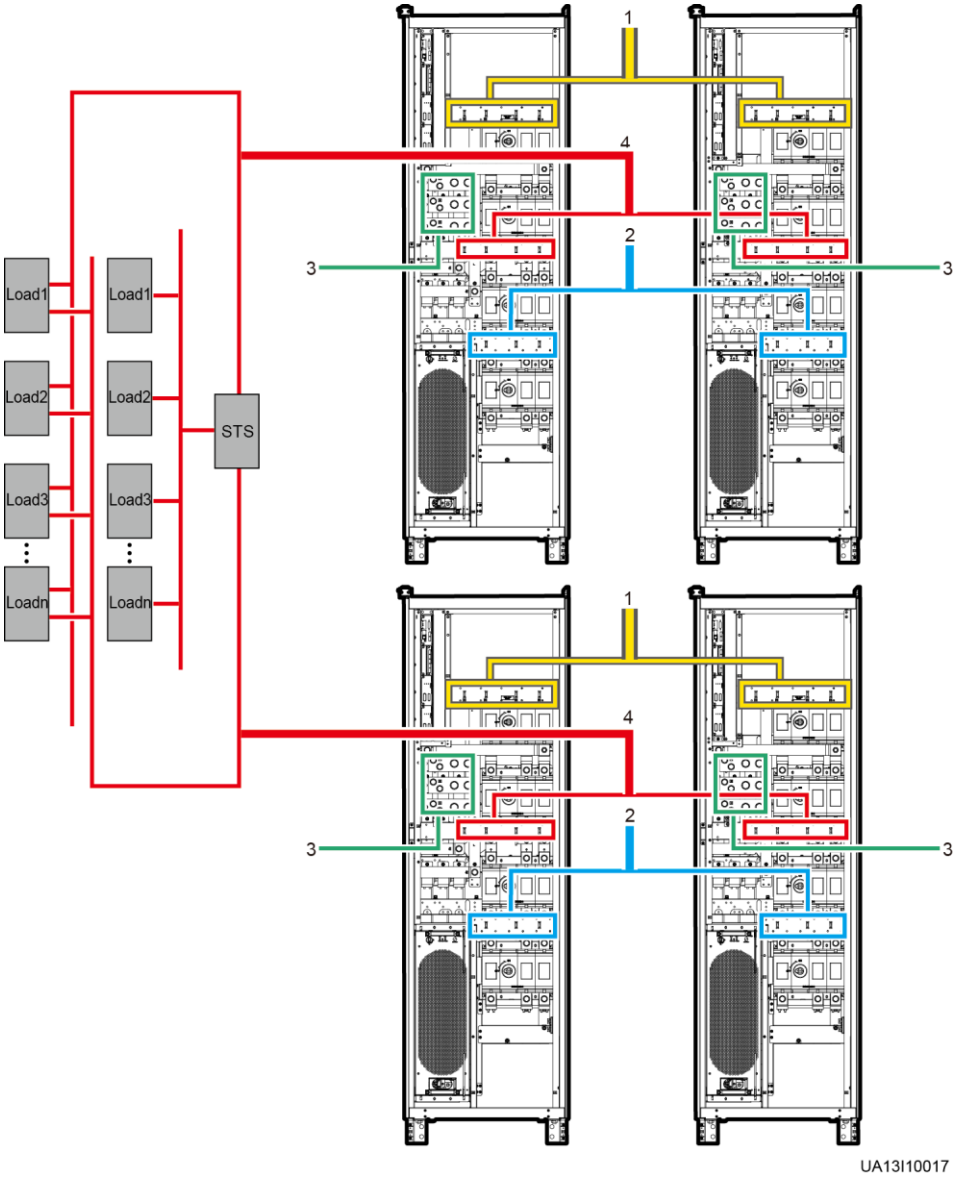
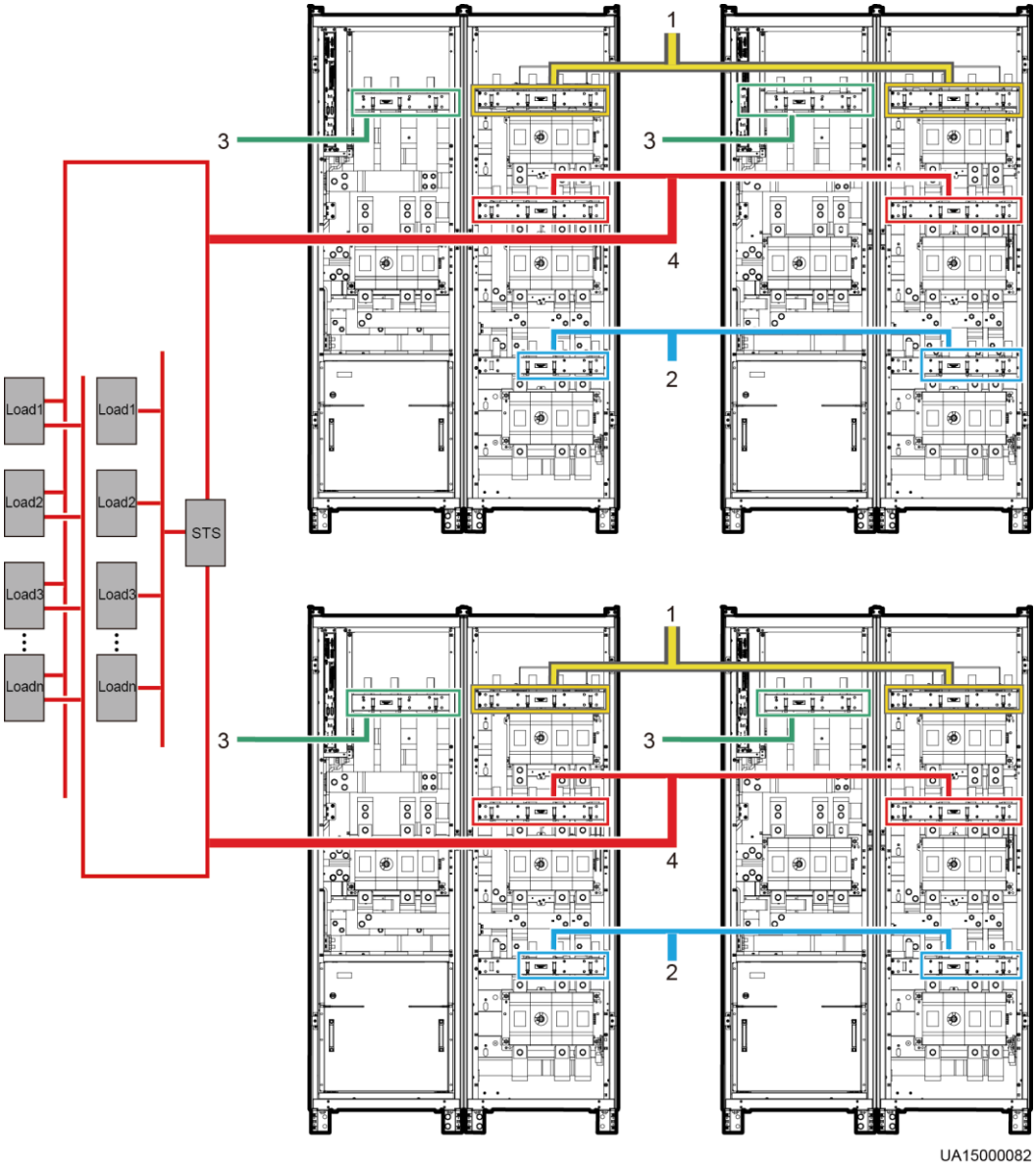


Figure 3-90 Cable connections for a dual-bus parallel system (400 kVA UPS)



(1) Mains input power cables (2) Bypass input power cables (3) Battery cables (4) Output power cables

Figure 3-91 Cable connections for a dual-bus parallel system (880 kVA UPS)



(1) Mains input power cables
(2) Bypass input power cables
(3) Battery cables
(4) Output power cables

----End

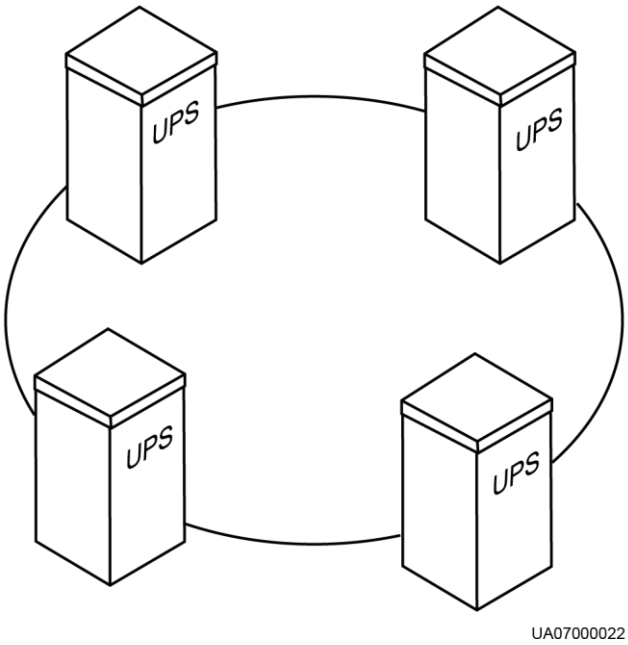
3.3.2 Connecting Signal Cables

Connecting Signal Cables to a Parallel System

Connect the parallel ports on the UPSs over parallel cables to create a loop.

- Figure 3-92 and Figure 3-93 show the wiring principle for an N+X parallel system.

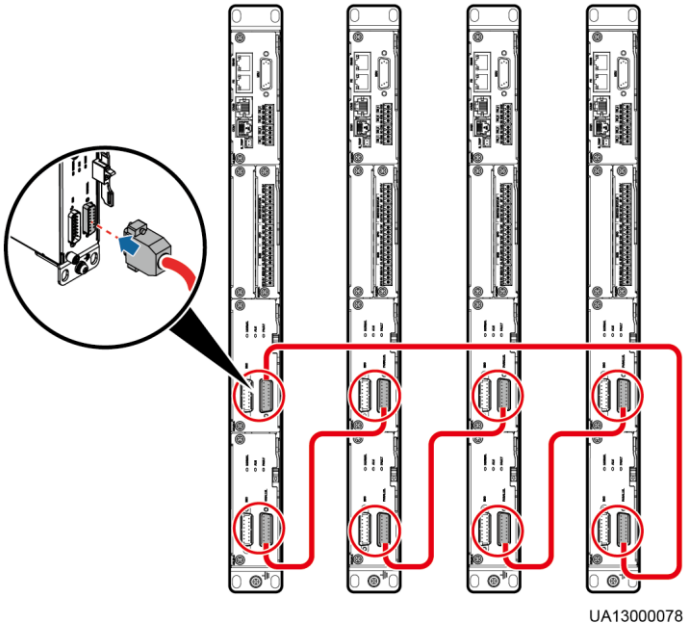
Figure 3-92 N+X parallel system topology



NOTICE

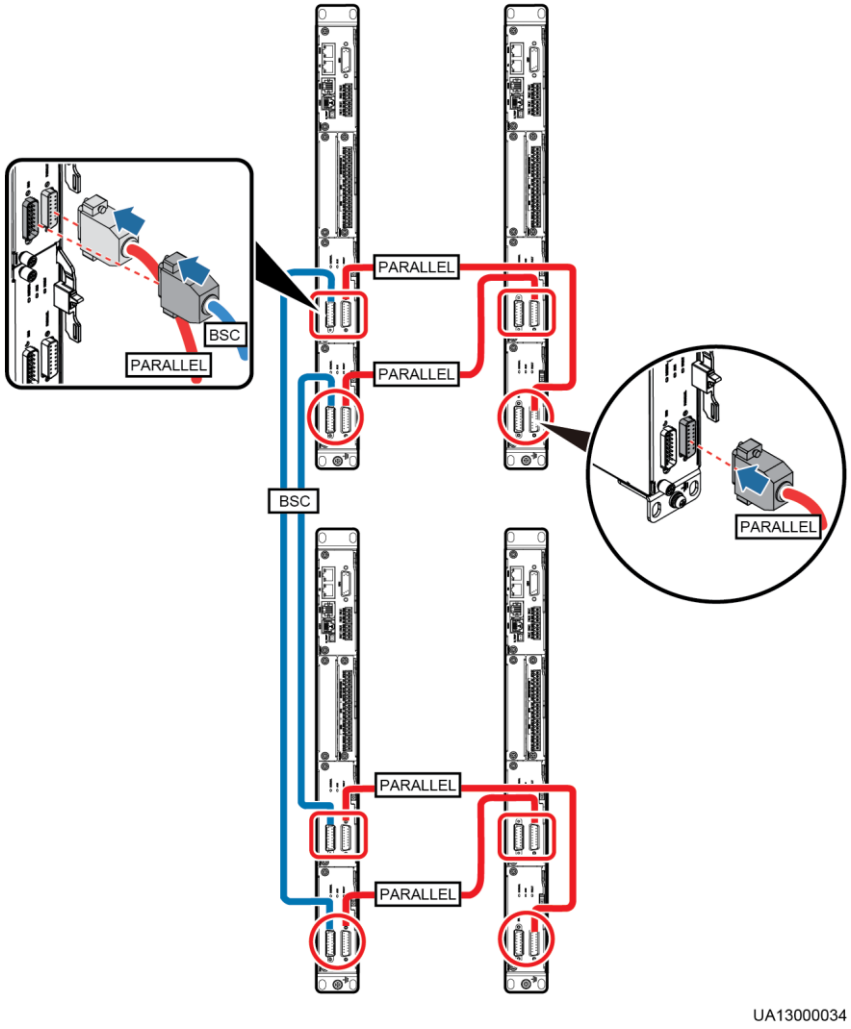
Figure 3-93 shows only the CM, which stands for the UPS.

Figure 3-93 Signal cable connections of N+X parallel system



- BSC master and slave cables are required in a dual-bus parallel system. Figure 3-94 shows the cable connections for a dual-bus system containing two master systems.

Figure 3-94 Connecting signal cables to a dual-bus system



Connecting Other Signal Cables

Connect signal cables for each UPS.

3.4 Installation Verification

Table 3-11 lists check items.

NOTICE

If the check results of listed items 8 and 9 in Table 3-11 do not meet the acceptance criteria, the UPS may be damaged.

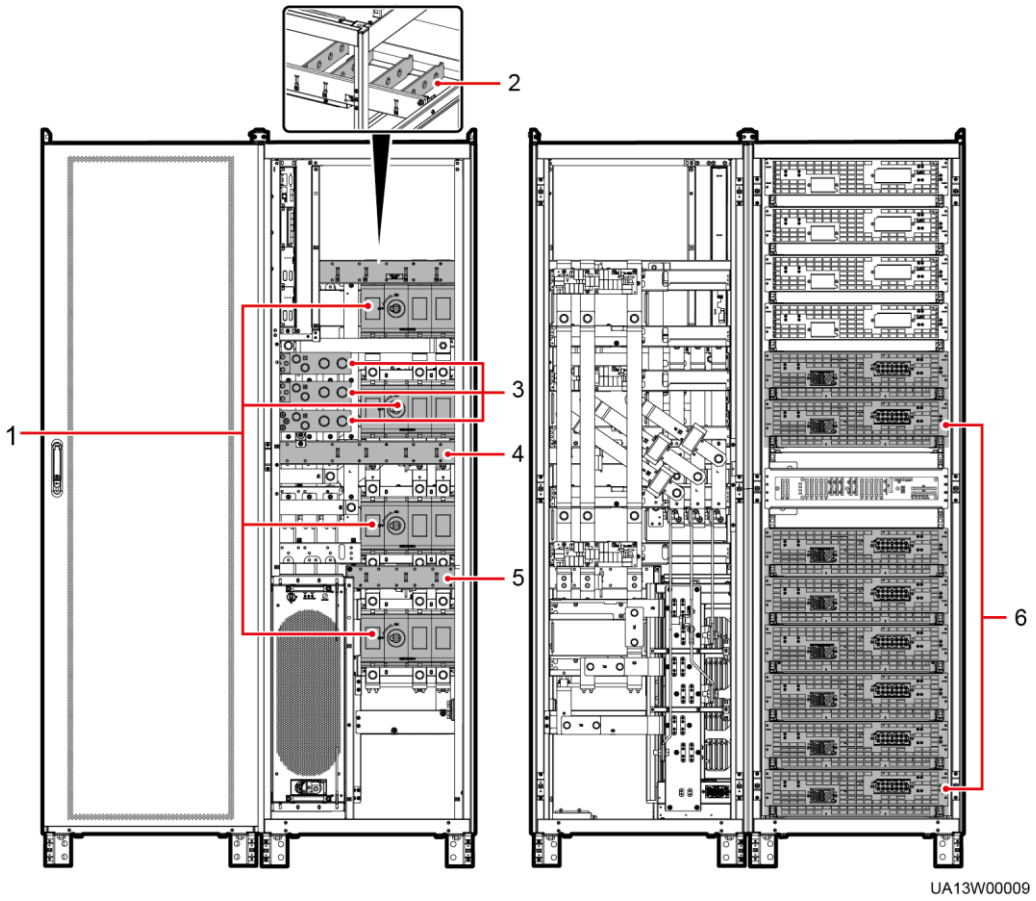
Table 3-11 Installation checklist

No.	Item	Acceptance Criteria
01	UPS installation	The UPS is securely installed and does not tilt due to vibration.
02	Neat arrangement	The UPS and its adjacent cabinets are neatly arranged and secured with connecting plates.
03	Cable layout	Cables are routed properly and cable routing meets customer requirements.
04	Cable labels	Both ends of a cable are labeled. Labels are concise and easy to understand.
05	Cable ties	Cable ties are secured evenly and no burr exists.
06	Cable connections	The input, output, and battery cables are securely connected. For the cables secured by screws, the spring washers are flattened.
07	Grounding	The resistance between the UPS ground bar and the equipment room ground bar is less than 0.1 ohm.
08	AC phase sequence	For a single UPS, the mains input, bypass input, and output phase sequences are correct. For a parallel system, the phase sequences of each UPS must be consistent.
09	Battery cable connections	The battery strings are correctly connected to the UPS.
10	Foreign matter cleaning inside the cabinet	The inside and outside of the cabinet, and other operating components, are free from conductive dust. 1. There is no foreign matter (such as copper wires and screws) on the top of the cabinet. 2. There is no foreign matter on the copper bar terminals. 3. There is no foreign matter around switch terminals. 4. There is no foreign matter on the bottom plate of the cabinet. 5. There is no foreign matter on the rear module subrack.

NOTE

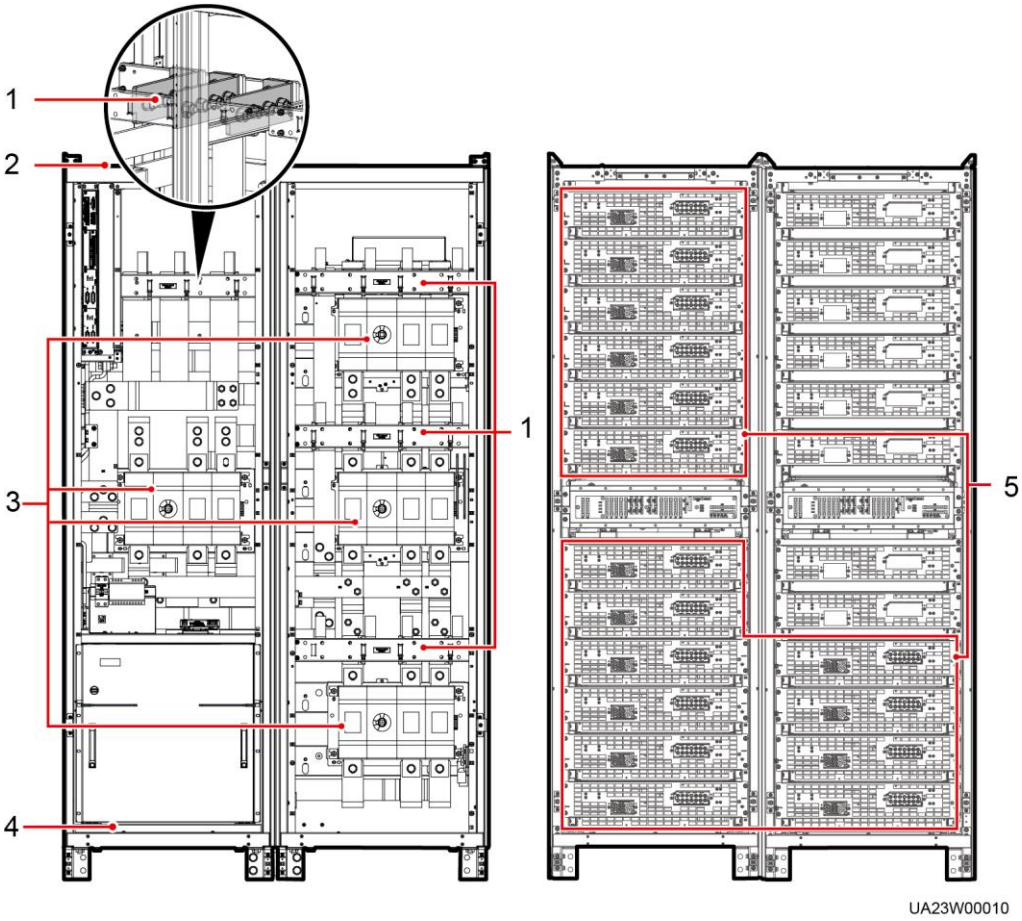
1. In the scenarios where holes are drilled for routing cables or covers are removed for routing cables, after routing cables and checking cable connections, use sealing putty to fill in the gap between the cables and the cabinet.
2. After verifying the installation, reinstall all the covers.
3. Do not remove the dustproof cover before power-on to prevent dust inside the UPS.

Figure 3-95 Positions to be checked for foreign matter (400 kVA)



(1) Switches	(2) Mains input wiring copper bar	(3) Battery input wiring copper bar
(4) Output wiring copper bar	(5) Bypass input wiring copper bar	(6) Rear of modules

Figure 3-96 Positions to be checked for foreign matter (880 kVA)



(1) Cabinet top (2) Wiring terminal block (3) Switches

(4) Cabinet bottom (5) Rear of modules

Figure 3-97 Fill the holes with sealing putty

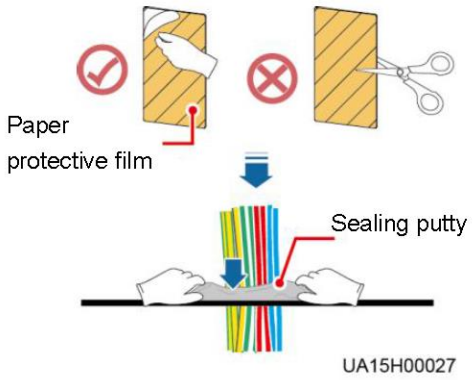
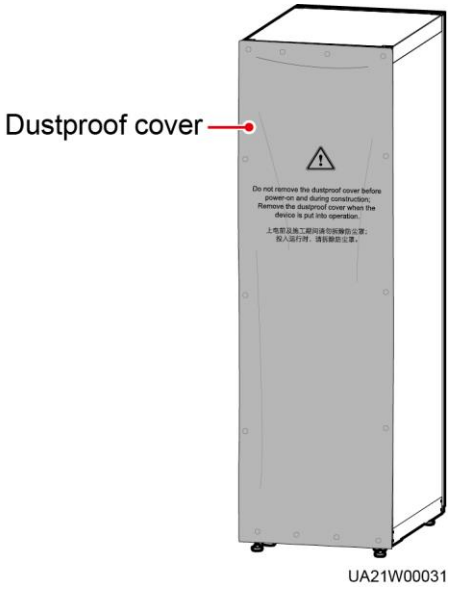


Figure 3-98 Dustproof cover



4 User Interface

4.1 LCD Interface

4.1.1 Main Menu

NOTICE

User interfaces displayed in this document correspond to the MDU version V300R001C95SPC600 and are for reference only.

The LCD screen is divided into three parts: status bar, alarm bar and information area. Figure 4-1 numerically labels functions of the default main screen, and Table 4-1 describes these functions.

Figure 4-1 Main Menu screen

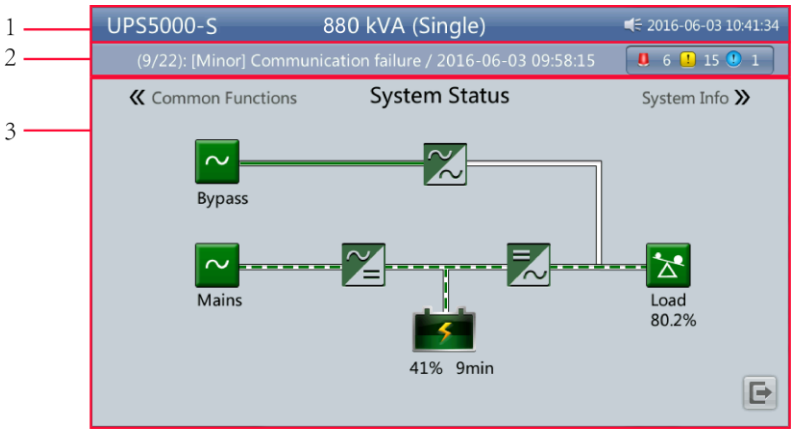


Table 4-1 Main screen description

Number	Area	Function
1	Status bar	Displays the UPS model, capacity, configuration, current date

Number	Area	Function
		and time, USB flash drive status, and buzzer status.
2	Alarm bar	Displays active alarms in a scrolling list and the number of active alarms based on severity. Tap the alarm icon area to open the active alarm page.
3	Information area	Displays the power flow as well as key information such as load and battery information. Tap the **Bypass**, **Mains**, **Battery**, and **Load** icons to view details.

Table 4-2 describes the functions of common buttons.

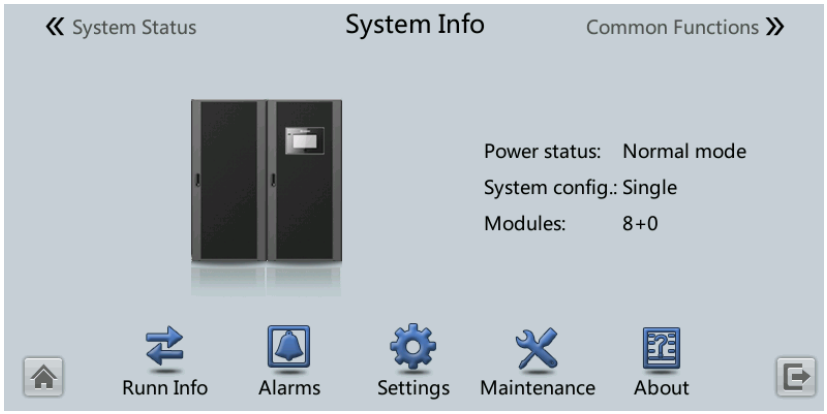
Table 4-2 Functions of common buttons

Button	Function
	Returns to the main screen.
	Scrolls the page down.
	Scrolls the page up.
	Returns to the upper-level menu.
	Logs a user out.

4.1.2 System Info Screen

On the main screen, tap **System Info**. The **System Info** screen is displayed, as shown in Figure 4-2.

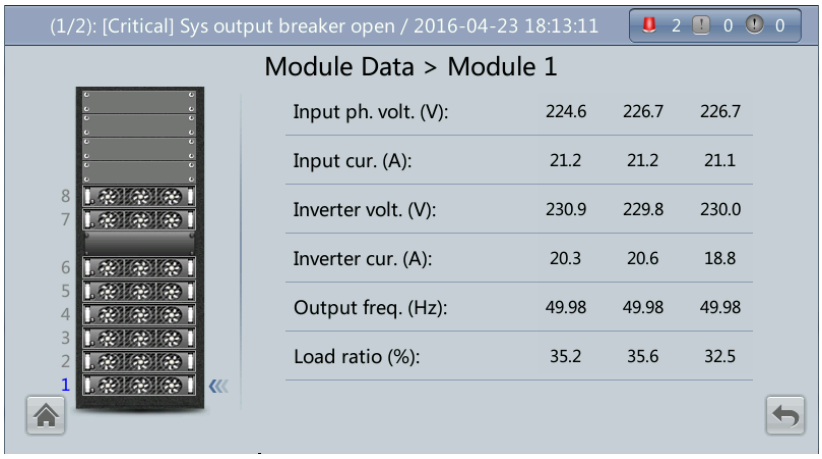
Figure 4-2 System Info screen



4.1.2.1 Module Data Screen

On the **System Info**, tap the UPS picture. On the **Module Data** screen, select a module to view its running data. indicates the selected module, as shown in Figure 4-3.

Figure 4-3 Module Data screen



4.1.2.2 Running

On the **System Info** screen, tap to access the **Runn Info** screen.

Figure 4-4 Running 1

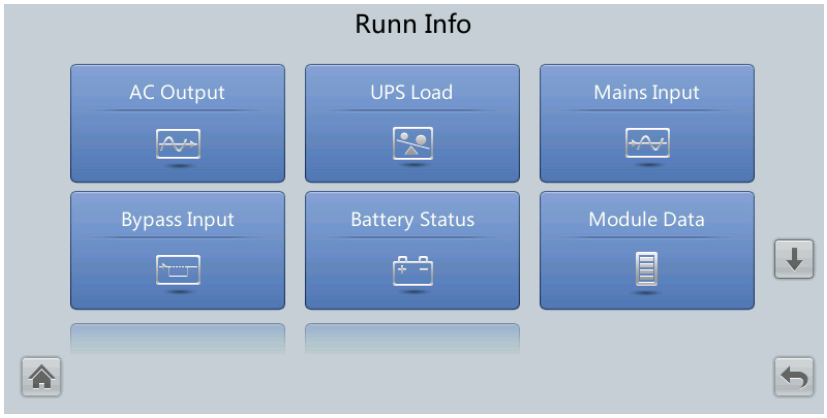


Figure 4-5 Running 2

NOTE

On the **System Info** > **Settings** > **iBOX Settings** > **Basic Param.** screen, if the **Number of iBOXs** is not **0** the **Battery Detailed Data** is displayed on the **Runn Info** screen.

Table 4-3 AC output

Item	Description
Phase voltage (V)	AC output phase voltage
Line voltage (V)	AC output line voltage
Phase current (A)	AC output phase current
Frequency (Hz)	AC output frequency
Power factor	Proportion of output active power to output apparent power.

Table 4-4 UPS load

Item	Description
Active power (kW)	Output active power of each phase on the UPS.
Apparent power (kVA)	Output apparent power of each phase on the UPS.
Reactive power (kvar)	Output reactive power of each phase on the UPS, that is, square root of the difference between the square of output apparent power and the square of output active power.
Load ratio (%)	Load ratio of each phase on the UPS, that is, proportion of actual power to rated power.
Crest factor	Proportion of the peak value of load current to the valid value.

Table 4-5 Mains input

Item	Description
Phase voltage (V)	Mains input phase voltage
Line voltage (V)	Mains input line voltage
Phase current (A)	Mains input phase current
Frequency (Hz)	Mains input frequency
Power factor	Proportion of the mains input active power to the mains input apparent power.

Table 4-6 Bypass input

Item	Description
Phase voltage (V)	Bypass input phase voltage
Line voltage (V)	Bypass input line voltage
Phase current (A)	Bypass input phase current
Frequency (Hz)	Bypass input frequency
Power factor	Proportion of the bypass input active power to the bypass input apparent power.

Table 4-7 Battery status

Item	Description
Battery Status	The value can be **Not connected**, **Equalized charging**,

Item	Description
	Float charging, **Hibernating**, **discharging**, or **Not chg. or dis**.
Voltage (V)	Voltage of the battery string.
Current (A)	Current of the battery string (the current is + when batteries are being charged and – when discharged).
Temperature (°C)	Battery operating temperature (A battery sensor is required. If the sensor is not installed, **NA** is displayed).
Backup time (min)	Battery backup time estimated at the current load.
Remaining cap. (%)	Remaining battery capacity.
SOH	State of health.

Table 4-8 Total runtime

Item	Description
Bypass runtime (h)	Time for which the UPS runs in bypass mode.
Inv. runtime (h)	Time for which the UPS runs in inverter mode.

NOTE

The value must be an integer. For example:

- If the value is less than 1, the value takes 0.
- If the value is greater than or equal to 1 and less than 2, the value takes 1.

Table 4-9 Environment data

Item	Description
Ambient temperature (°C)	Temperature measured by the ambient temperature and humidity sensor. (An ambient temperature and humidity sensor is required. If no sensor is connected, the ambient temperature sampled by the bypass module is displayed.)
Ambient humid. (%)	Humidity measured by the ambient temperature and humidity sensor. If the sensor is not installed, **NA** is displayed.

- Module Data: reflects each data of a module.
- Battery Detailed Data - Batt. String Data: reflects the voltage, current, SOC, and SOH data of each battery string.
- Battery Detailed Data - String N Battery Data: reflects the temperature, voltage, internal resistance, current, SOC, and SOH data of a single battery in the battery string.

4.1.2.3 Alarms Screen

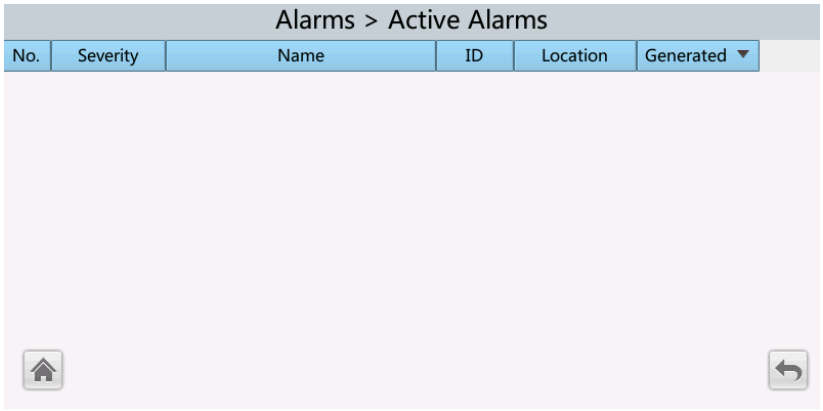
Tap  on the **System Info** screen to enter the **Alarms** screen.

Figure 4-6 Alarms Screen

Active alarms

This screen displays alarm information including the severity, name, ID, location, and generation time.

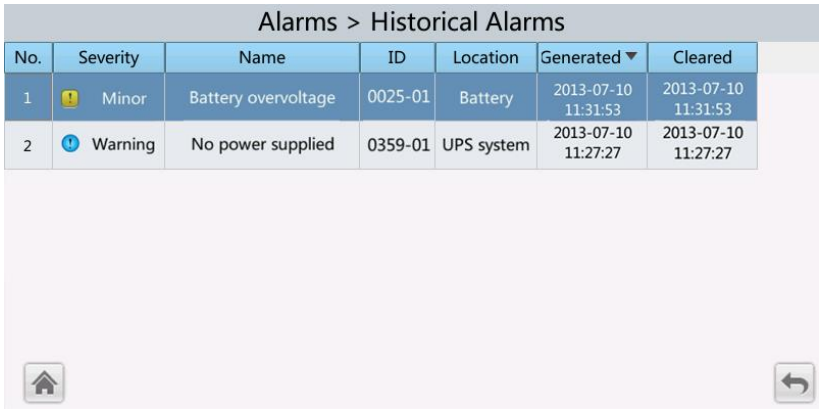
Figure 4-7 Active alarms



Historical alarms

This screen displays alarm information including the severity, name, ID, location, generation time, and clear time.

Figure 4-8 Historical alarms



Buzzer Off

Two buzzer menus are available:

- **Buzzer On**

  If this selection is enabled, when a critical alarm, a minor alarm, or a certain warning is generated the buzzer is activated.
- **Buzzer Off**

  If this selection is enabled, the buzzer is muted.

If the buzzer is enabled, **Buzzer Off** is displayed on the operation screen.

4.1.2.4 Settings

On the **System Info** screen, tap  to access the **Settings** screen.

Figure 4-9 Settings 1

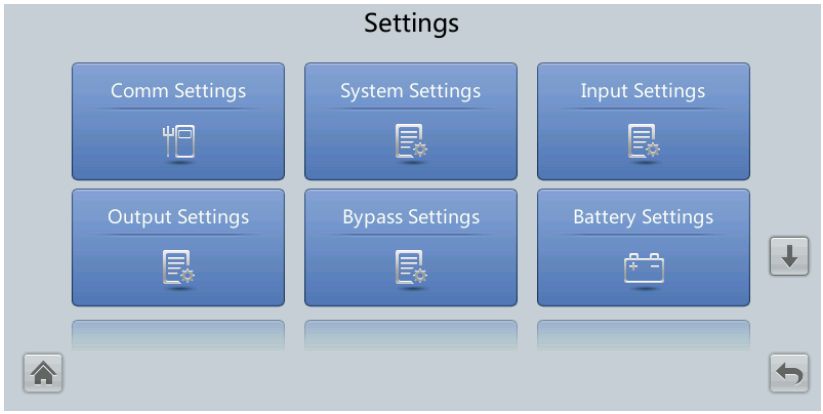
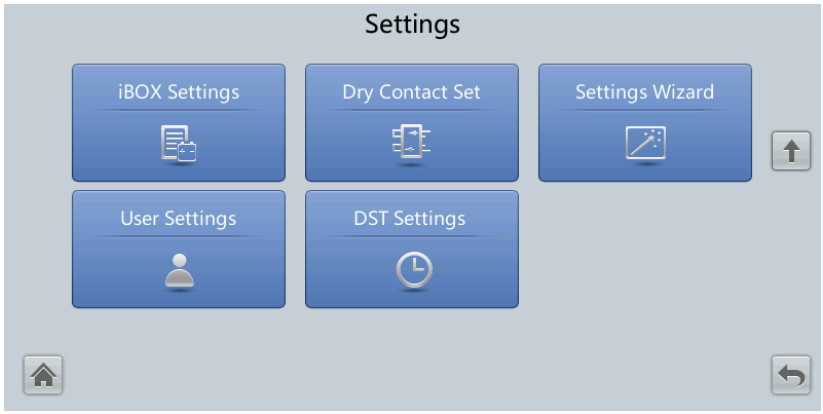


Figure 4-10 Settings 2



Communication Settings

Figure 4-11 Communication settings 1

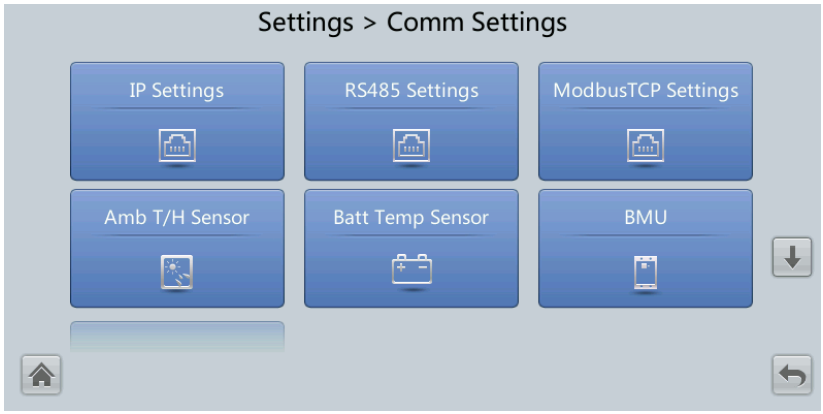


Figure 4-12 Communication settings 2

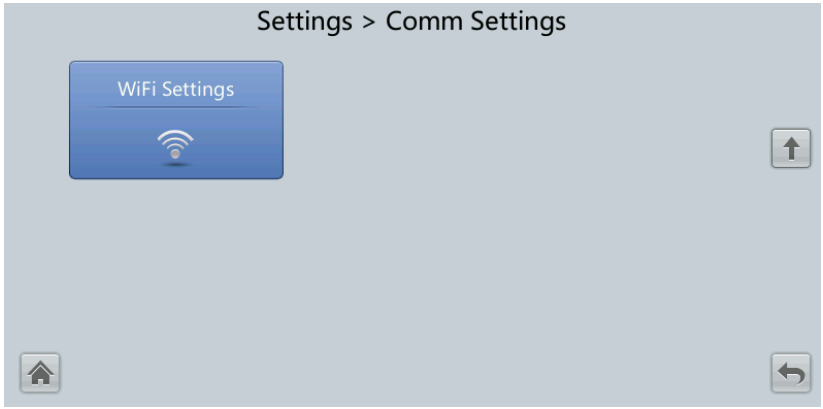
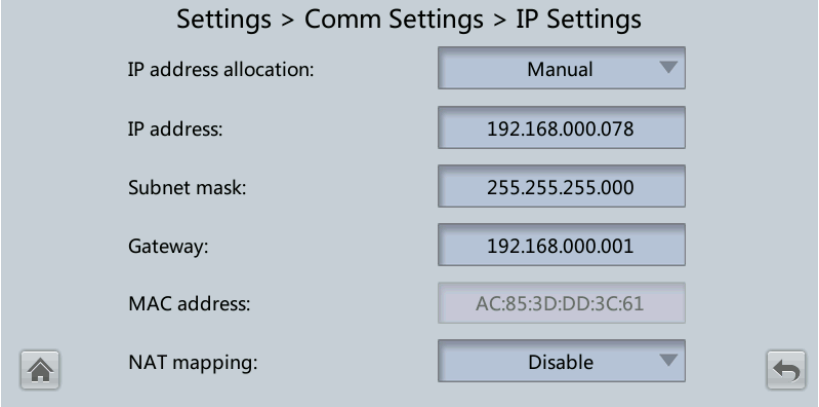


Figure 4-13 IP settings



IP address allocation

- If the MDU is directly connected to a computer, the IP address can only be allocated manually. The IP addresses of the MDU and computer must be in the same network segment, and must be different.
- If the MDU is connected to a computer through a LAN switch or router with the DHCP function, the IP address can be allocated manually or automatically. Manual allocation is used by default.
  - **Manual**: Check that their IP addresses are two different values on the same network segment. Set the UPS IP address to be in the same subnet as the PC IP address. Perform the bitwise AND operation for the UPS IP address and the PC IP address with the subnet mask respectively. If the operation results are the same, the two IP addresses are in the same subnet.

    AND operation rule: 1 AND 1 = 1, 1 AND 0 = 0, 0 AND 1 = 0, 0 AND 0 = 0. That is when the corresponding bits are both 1, the result is 1. In other cases, the result is 0.

Table 4-10 Bitwise AND operation example

-	PC IP address (182.98.225.125)	UPS IP address (182.98.225.112)
PC IP address/UPS IP address	10110110.01100010.11100001.01111101	10110110.01100010.11100001.01110000
Subnet mask (255.255.255.192)	11111111.11111111.11111111.11000000	11111111.11111111.11111111.11000000
Bitwise AND operation result	10110110.01100010.11100001.01000000	10110110.01100010.11100001.01000000

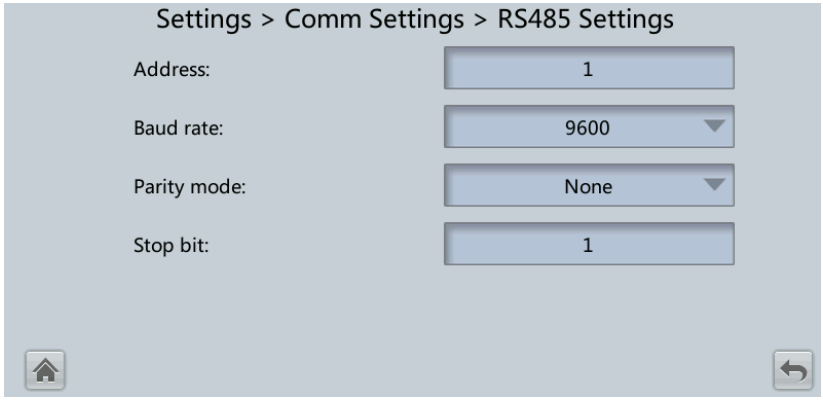
  - **Automatic**: The MDU automatically searches for available IP addresses in the connected network. Ensure that the MDU and PC are on the same network segment.

NOTE

After you restart the device, **IP address allocation** changes back to **Manual**. The IP address is set to the IP address set previously.

Item	Description	Default Value	Value Range
IP address	Specifies the IP address for the Ethernet. **NOTICE** Ensure that the UPS IP address is unique on the network segment. Otherwise, the WebUI display function may not function properly.	192.168.0.10	1.0.0.0–223.255.255.255
Subnet mask	Specifies the subnet mask of the Ethernet.	255.255.255.0	0.0.0.0–255.255.255.255
Gateway	Specifies the Ethernet gateway.	192.168.0.1	1.0.0.0–223.255.255.255
MAC address	Defines the physical address of network equipment and is not configurable.	-	-
NAT mapping	NAT means network address translation. If it is set to **Disable**, Internet cannot access IP addresses in the local area network (LAN).	Disable	Disable, Enable

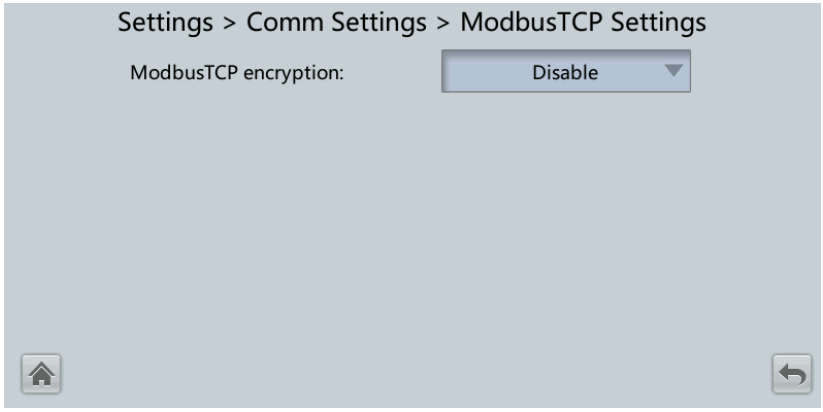
Figure 4-14 RS485 settings



Item	Description	Default Value	Value Range
Address	This serial port address is allocated by the user.	1	1–254
Baud rate	Select a baud rate to match the user's network management conditions onsite.	9600	9600, 19200, 115200
Parity mode	Verify the validity of RS485 communication characters. When a device node adopts RS485	None	None, Odd, Even

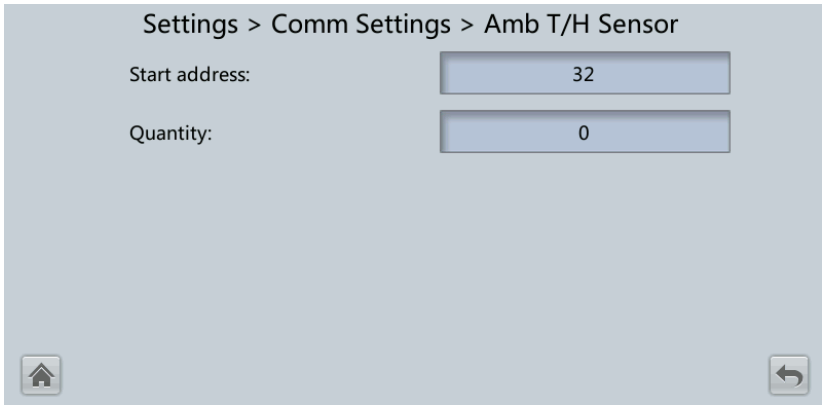
Item	Description	Default Value	Value Range
	communication, ensure that the parity modes for the device nodes are set to the same mode.		
Stop bit	Stop bit in the Modbus communication frame format. When the UPS is connected over the serial port Modbus, set this parameter based on the frame format that the upstream device Modbus supports.	1	1–2

Figure 4-15 Modbus TCP settings



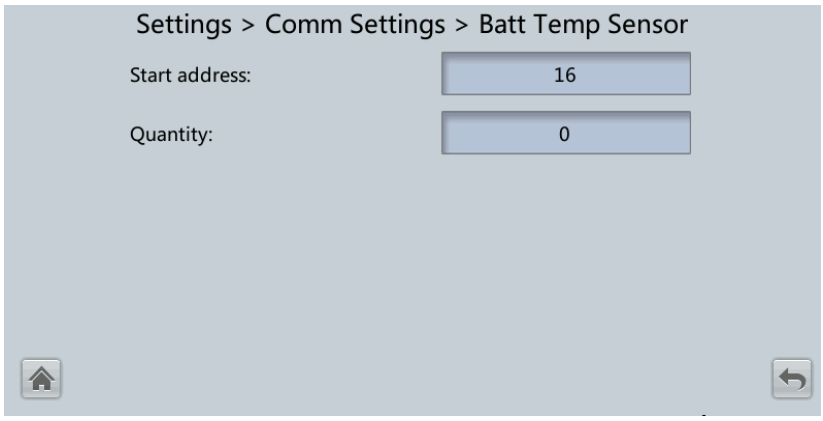
Item	Description	Default Value	Value Range
ModbusTCP encryption	If Modbus TCP is used for communication, communication links do not implement encryption or implement encryption based on the selected encryption mode.	Enable	Disable, Enable

Figure 4-16 Ambient temperature and humidity sensor



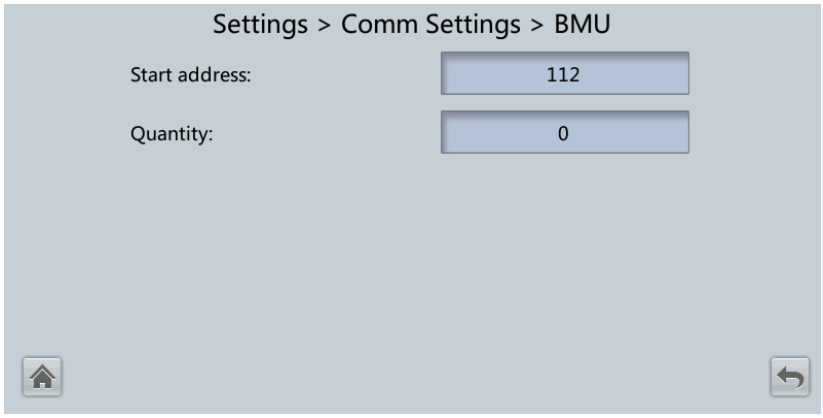
Item	Description	Default Value	Value Range
Start address	-	32	32–44
Quantity	Number of cascaded ambient temperature and humidity sensors	0	0–4

Figure 4-17 Battery temperature sensor



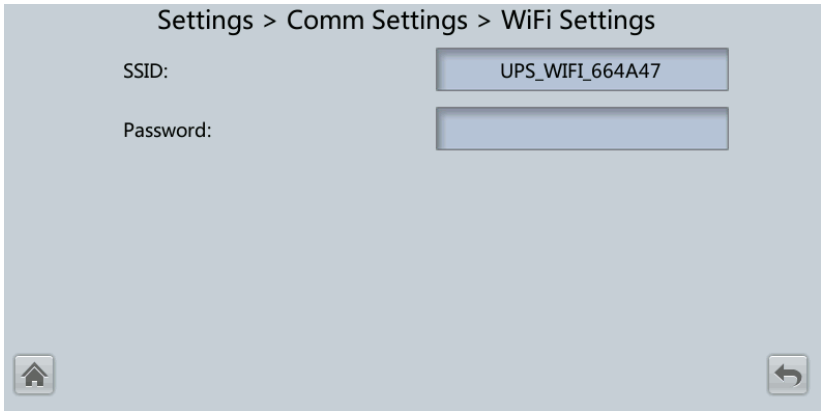
Item	Description	Default Value	Value Range
Start address	-	16	16–28
Quantity	Number of cascaded battery temperature sensors	0	0–4

Figure 4-18 BMU



Item	Description	Default Value	Value Range
Start address	-	112	-
Quantity	Number of cascaded BMUs	0	0–12

Figure 4-19 WiFi communication settings



Item	Description	Default Value	Value Range
SSID	When using the mobile app for site setup or inspection, set WiFi SSID after connecting a WiFi module over a USB port to identify the WiFi device to which the mobile phone is connected.	UPS_WIFI + Last six characters of the MAC address	-
Password	The password for accessing WiFi.	Changeme	-

System Settings

Figure 4-20 System settings 1

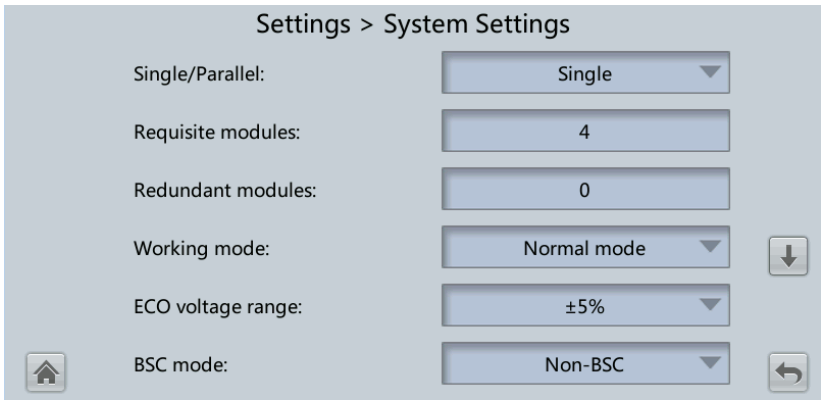


Figure 4-21 System settings 2

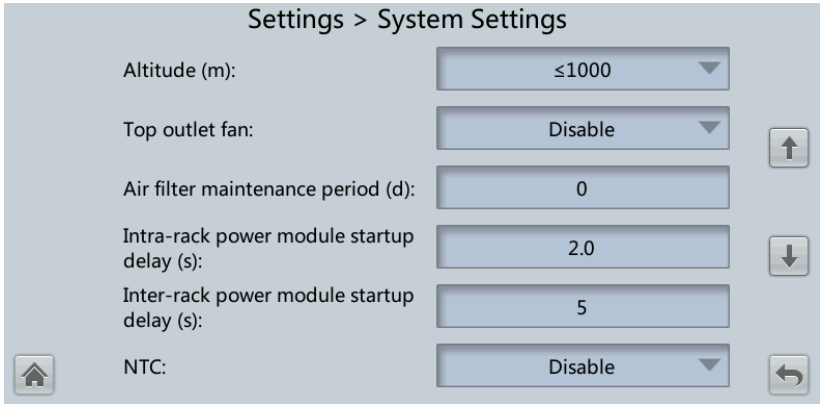
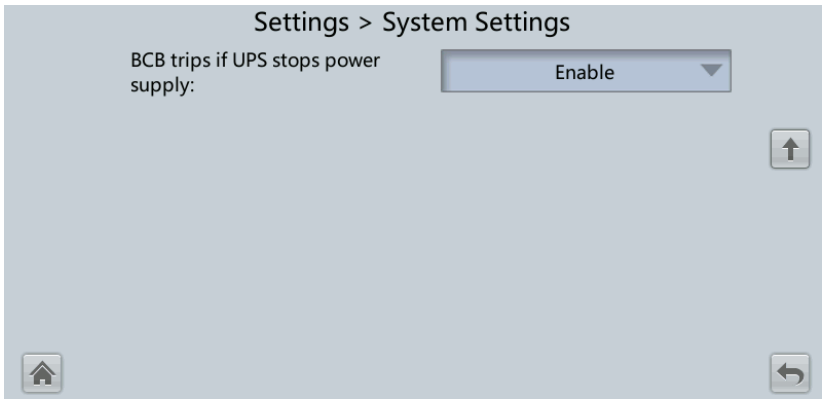


Figure 4-22 System settings 3

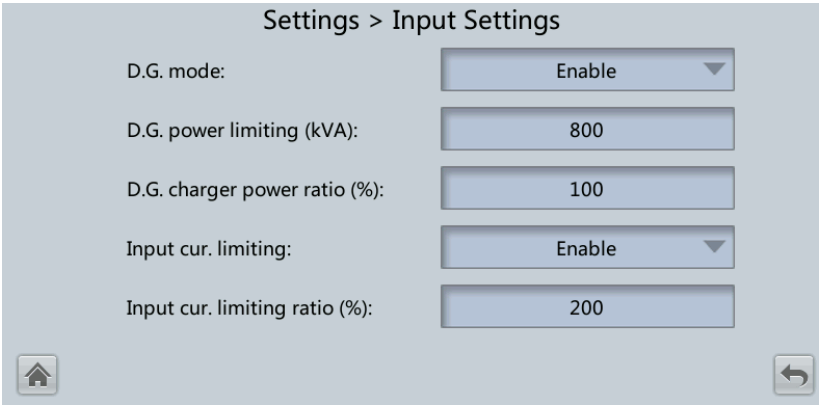


Item	Description	Default Value	Value Range
Single/Parallel	Specifies whether the UPS works in single mode or parallel mode.	Single	Single, Parallel
Requisite modules	Matches the system capacity.	-	-
Redundant modules	Set this parameter based on load capacity and redundancy requirements.	0	0–19
Working mode	UPS working mode	Normal mode	Normal mode, ECO, Self-load mode, Converter mode
ECO voltage range	In ECO mode, when the difference between the bypass voltage and the rated voltage is greater than this value, the system determines that the ECO voltage is abnormal and transfers to normal mode.	±5%	±5%, ±6%, ±7%, ±8%, ±9%, ±10%
BSC mode	• Set this parameter to **Standard BSC mode** for a dual-bus system. • After setting this parameter to **Standard BSC mode**, you need to set the two UPS systems in the dual-bus system to **BSC master system** and **BSC slave system** respectively in the **BSC master/slave system** setting. (The two UPS systems cannot be BSC master systems or BSC slave systems at the same time. If you need to change the settings in the future, perform operations under the guidance of maintenance engineers.) **NOTE** Ensure that the BSC signal cable between the BSC master and slave systems is properly connected and that BSC-related hardware is properly installed.	Non-BSC	Non-BSC, Standard BSC
Altitude (m)	Set this parameter based on the altitude of the place where the rack is used.	≤ 1000	≤ 1000, 1000–2000, 2000–3000, 3000–4000, 4000–5000

Item	Description	Default Value	Value Range
Top outlet fan	Enable this parameter if a top outlet fan is configured. Then the fan running status can be checked.	Disable	Disable, Enable
Air filter maintenance period (d)	Specifies the rack air filter maintenance interval. If it is set to **0**, there is no reminder.	0	0–365
Intra-rack power module start delay (s)	These two parameters enable the UPS to control the interval that each rack (or module) transfers from battery mode to normal mode, which reduces the impact on the generator or power grid. In the case of battery undervoltage, the system automatically shortens the delay for transferring to normal mode to 1/8 of the normal delay to accelerate the transfer and prevent battery overdischarge. **Intra-rack power module start delay (s)** can be set to a value ranging from 0.5 to 120. **Inter-rack power module start delay (s)** can be set to a value ranging from 2 to 120. The preset value of **Inter-rack power module start delay (s)** is 5.0. The start delay of a module in a rack varies depending on the rack number and module number. #1 module in rack 1 does not have a start delay.	The default value of this parameter depends on the default number of power modules. The default value is 2.0, 1.0, and 0.5 for 1–5, 6–10, and 10–20 power modules respectively.	0.5–120.0
Inter-rack power module start delay (s)		5	2–120
NTC	The short-distance battery temperature sensor monitors the ambient temperature near batteries, and ensures that batteries work reliably and securely.	Disable	Disable, Enable
BCB trips if UPS stops power supply	Indicates whether the BCB trips when the system stops supplying power and the output power is off.	Enable	Disable, Enable

Input Settings

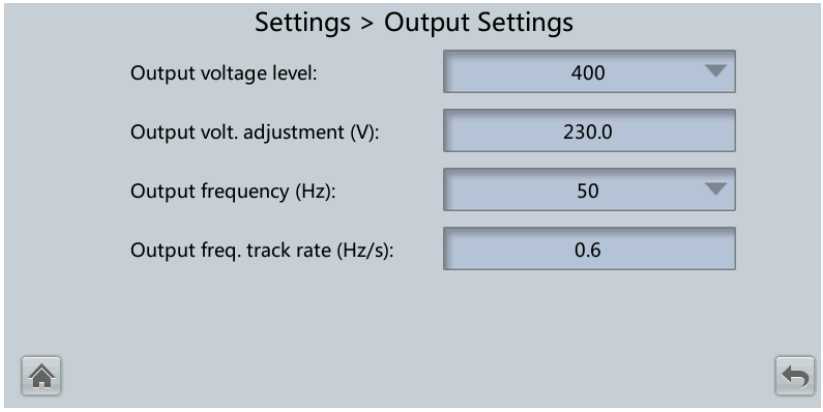
Figure 4-23 Input settings



Item	Description	Default Value	Value Range
D.G. mode	Set this parameter to **Enable** when a D.G. connects to the input PDC. The UPS enters the D.G. mode when a D.G. is detected over dry contacts.	Disable	Disable, Enable
D.G. power limiting (kVA)	Set these two parameters to control the valid input current and limiting input current, which prevents load impact and facilitates better cooperation between the UPS and the D.G.	Depends on the actual model.	0 kVA to 5000 kVA
D.G. charger power ratio (%)		0	0%–100%
Input cur. limiting	Specifies whether to enable or disable input current limiting to protect generators.	Disable	Disable, Enable
Input cur. limiting ratio (%)	Limits the input current to protect the D.G.	200%	50%–200%

Output Settings

Figure 4-24 Output settings

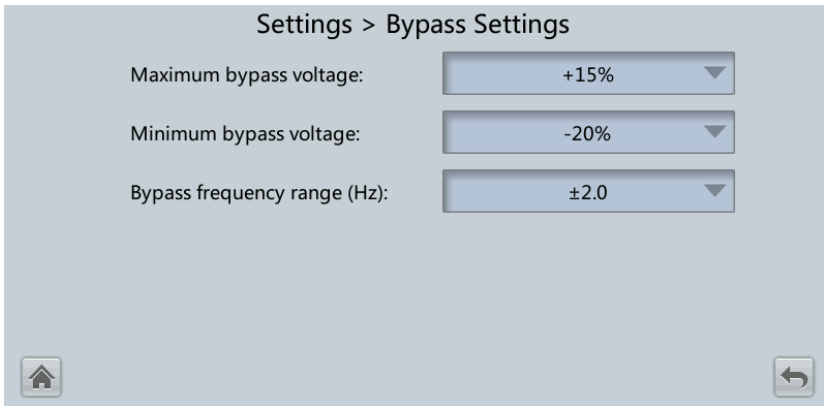


Item	Description	Default Value	Value Range
Output voltage level	Specifies the system output voltage level. This parameter is configurable only after the inverter shuts down. After you change the voltage level, the upper limit of the bypass voltage restores to the default value. (If the voltage level is 380 V or 400 V, the default upper limit is +15%. If the voltage level is 415 V, the default upper limit is +10%.)	400	380, 400, 415
Output volt. adjustment (V)	The output voltage can be slightly adjusted based on the onsite power distribution condition to ensure a minimum difference between the output voltage and the bypass voltage and facilitate uninterruptible power supply when the UPS transfers from normal mode to bypass mode.	The default value is 220.0, 230.0, and 240.0 when the voltage level is 380 V, 400 V, and 415 V respectively.	380 V: 209.0–231.0 400 V: 218.5–241.5 415 V: 228.0–252.0
Output frequency (Hz)	Specifies the system output frequency level.	50 Hz	50 Hz, 60 Hz
Output freq. track rate (Hz/s)	This parameter can be adjusted based on site requirements. If **Output freq. track rate (Hz/s)** is slow, the inverter frequency is different from the bypass frequency when the bypass frequency changes. If output is overloaded or the inverter is	0.6 Hz/s	0.1 Hz/s to 2.0 Hz/s

Item	Description	Default Value	Value Range
	faulty, an interruption (less than 20 ms) occurs when the UPS transfers from normal mode to bypass mode. If **Output freq. track rate (Hz/s)** is fast, the inverter frequency is unstable.		

Bypass Settings

Figure 4-25 Bypass settings



Item	Description	Default Value	Value Range
Maximum bypass voltage	When the difference between the bypass voltage and the rated voltage exceeds the upper threshold for the bypass voltage, the system determines that the bypass voltage is not normal and that the bypass is unavailable.	• When the voltage level is 380 V, the value range is +10%, +15%, +20%, and +25%. The default value is +15%. • When the voltage level is 400 V, the value range is +10%, +15%, and +20%. The default value is +15%. • When the voltage level is 415 V, the value range is +10% and +15%. The default value is +10%.	
Minimum bypass voltage	When the difference between the bypass voltage and the rated voltage exceeds the upper threshold for the bypass voltage, the system determines that the bypass voltage is not normal and that the bypass is unavailable.	–20%	–10%, –15%, –20%, –30%, –40%, –50%, –60%
Bypass frequency	When the difference between the bypass input frequency and the	±2 Hz	±0.5 Hz to ±6

Item	Description	Default Value	Value Range
range (Hz)	rated frequency is greater than the specified value, the system determines that the bypass frequency is abnormal, so the bypass is unavailable.		Hz

Battery Settings

NOTICE

Battery parameter settings impact battery maintenance, battery lifespan, and UPS discharge time. When you set battery parameters, note the following:

- **Battery string sharing** is unavailable when **Single/Parallel** is set as **Single**.
- **Battery string sharing** affects the actual charge current and the estimated discharge time. An incorrect setting will cause a high or low charge current, which may damage the batteries. An incorrect estimated discharge time may cause a data backup fault.
- When you set parameters, ensure the following: **Dis. cur. 0.1C EOD** ≥ **Dis. cur. 0.3C EOD** ≥ **Dis. cur. 0.5C EOD** ≥ **Dis. cur. 1.0C EOD**.
- A cell consists of electrodes and electrolyte, which is the basic unit for the battery. Each cell has a nominal voltage of 2 V. A battery is a module consisting of single or multiple cells in a shell. Each battery has a nominal voltage of 2 V, 6 V, or 12 V.

Figure 4-26 Battery settings 1

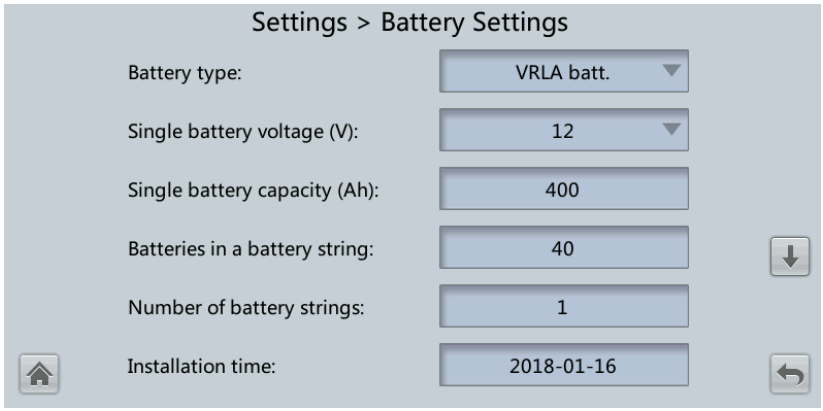


Figure 4-27 Battery settings 2

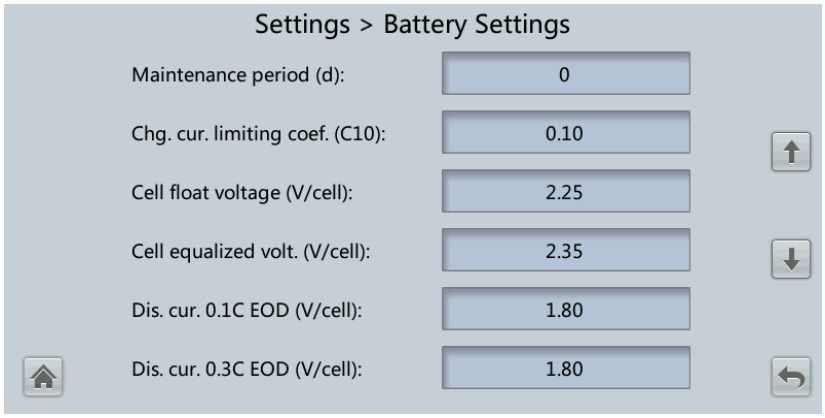
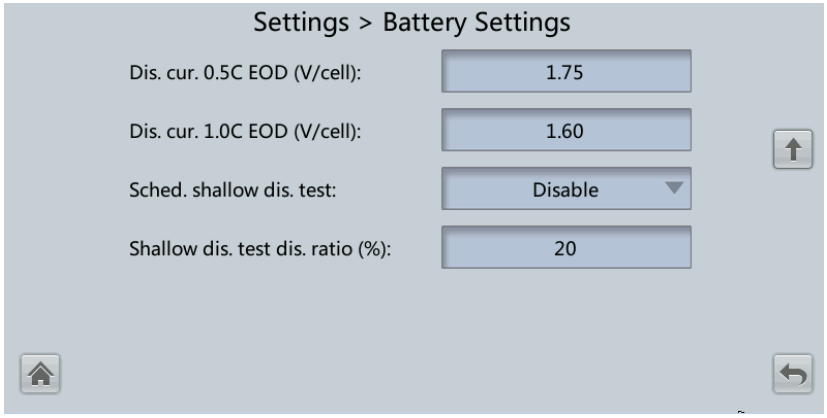


Figure 4-28 Battery settings 3

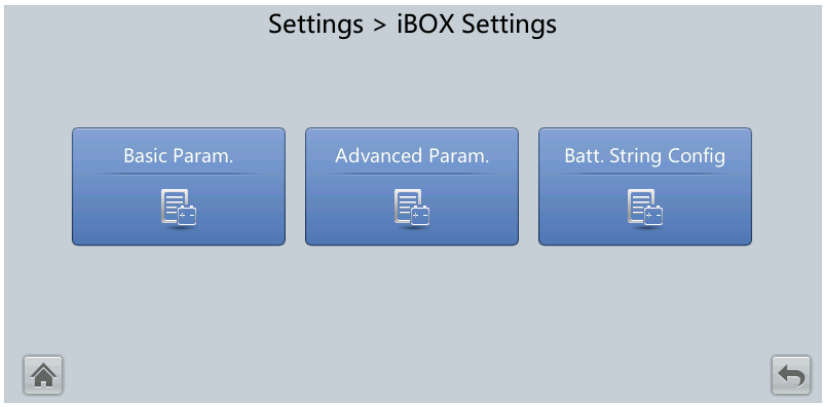


Item	Description	Default Value	Value Range
Battery type	Currently, only **VRLA batt.** is supported.	-	-
Single battery voltage (V)	Specifies the voltage of each battery that is connected in the battery string in series.	12 V	2, 6, 12
Single battery capacity (Ah)	Specifies the capacity of each battery that is connected in the battery string in series.	Depends on the actual model.	5–9999
Batteries in a battery string	Specifies the number of batteries in a battery string.	The default value depends on the model.	The value range depends on the model.
Number of battery strings	Specifies the number of battery strings connected in parallel.	1	1–4
Installation time	A battery maintenance reminder is displayed when the	-	-

Item	Description	Default Value	Value Range
	maintenance time (counted from the installation time) comes.		
Maintenance period (d)	Specifies the interval for reminding users of battery maintenance.	0	0–365
Chg. cur. limiting coef. (C10)	The charging current limit is a multiple of the battery capacity.	0.1C10	0.05C10 to 0.15C10
Cell float voltage (V/cell)	Specifies the battery float charging voltage.	2.25 V/cell	2.23 V/cell to 2.30 V/cell
Cell equalized volt. (V/cell)	Specifies the battery equalized charging voltage.	2.35 V/cell	2.30 V/cell to 2.40 V/cell
Dis. cur. 0.1C EOD (V/cell)	Specifies the EOD threshold when the discharging current is 0.1C, 0.3C, 0.5C, and 1.0C respectively.	1.80 V/cell	1.8–1.9
Dis. cur. 0.3C EOD (V/cell)		1.80 V/cell	1.8–1.9
Dis. cur. 0.5C EOD (V/cell)		1.75 V/cell	1.75–1.85
Dis. cur. 1.0C EOD (V/cell)		1.60 V/cell	1.6–1.75
Sched. shallow dis. test	When certain conditions are met, the charger shuts down, and batteries supply power to loads. The system records the battery discharge data as the reference for battery capacity and lifespan.	Disable	Disable, Enable
Shallow dis. test dis. ratio (%)	Set the proportion of the discharge capacity to the total discharge capacity. The value is configurable in any mode.	20%	10%–50%

iBOX Settings

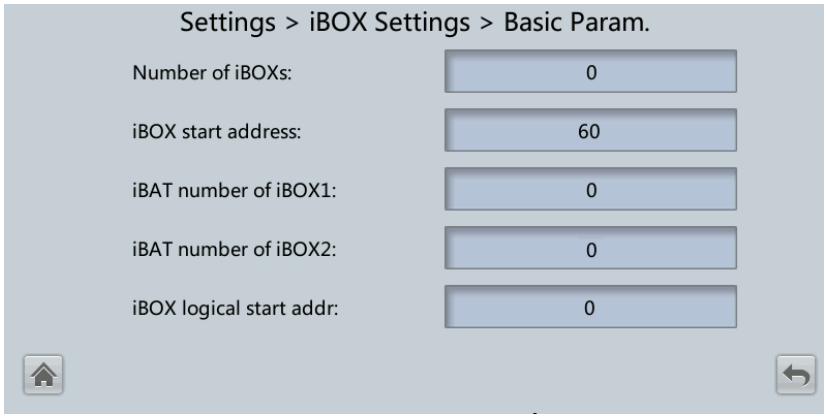
Figure 4-29 iBOX Settings



NOTE

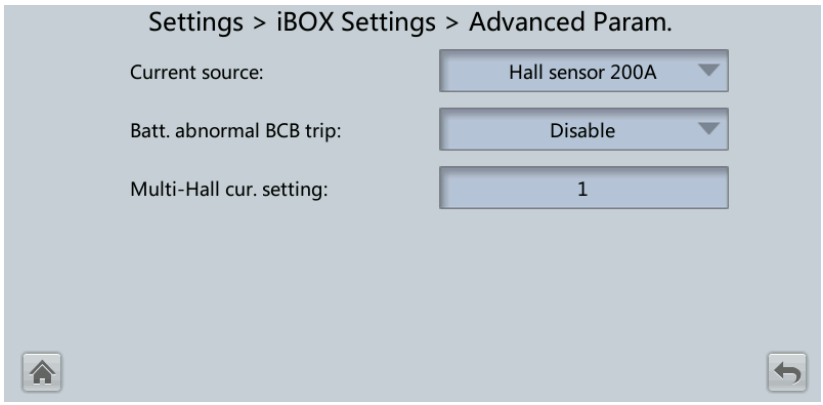
On the **System Info** > **Settings** > **iBOX Settings** > **Basic Param.** screen, if the **Number of iBOXs** is not **0** the **Batt. String Config** is displayed on the **iBOX Settings** screen.

Figure 4-30 Basic Param.



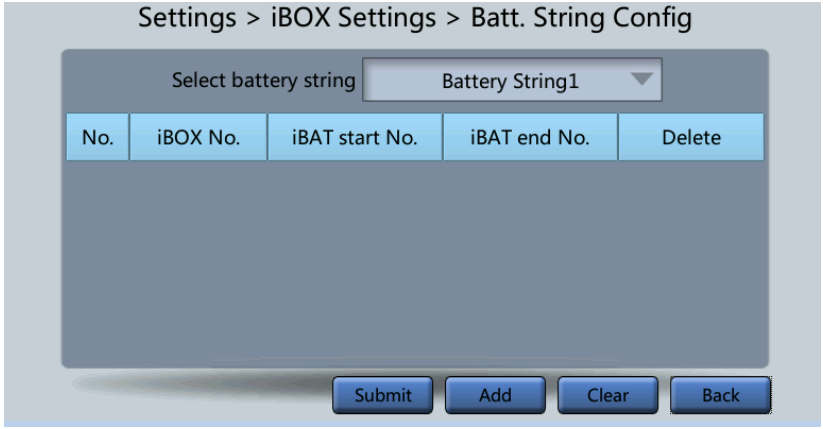
Item	Description	Default Value	Value Range
Number of iBOXs	The number of iBOXs connected to UPS.	0	0–4
iBOX start address	Communication address of the iBOX when the UPS queries iBOX data.	60	N/A
iBOX number of iBATs	Specifies the number of iBATs managed by the iBOX.	0	0–300
iBOX logical start addr	Specifies the communication address when the northbound device queries iBOX data.	0	0–124

Figure 4-31 Advanced Param.



Item	Description	Default Value	Value Range
Current source	Specifications of the Hall effect sensor used to detect iBOX current.	Hall sensor 200A	Hall sensor 200A, Hall sensor 600A, Hall sensor 1500A
Batt. abnormal BCB trip	Specifies whether BCB trips when batteries are abnormal.	Disable	Disable, Enable
Multi-Hall cur. setting	**Multi-Hall cur. setting** is equal to the number of Hall effect sensors at the positive or negative terminal of a battery string (Multi-Hall cur. setting ≥ 1).	1	1–8

Figure 4-32 Batt. String Config



Set the iBOX and iBAT number for each battery string.

Dry Contact Set

NOTICE

- Set only the dry contacts that are needed. Otherwise, the UPS may not run properly.
- When a dry contact card is disabled, its dry contact signals are disabled.
- After a dry contact card is enabled, its dry contact signals can be displayed on the LCD.
- Disable all the dry contacts for a dry contact card that is not connected and all the dry contacts that are not used to prevent false alarms.
- ( ) encloses a unit, and [ ] encloses silk screen.

Specify dry contact settings on the following cards:

- Dry contact card (MUE05A): provides dry contact signals for the battery grounding failure detector, D.G., BCB box, and PDCs.
- Backfeed protection board (MUE06A): provides backfeed protection signals. This board can be enabled or disabled.
- Monitoring interface card (MUS05A): provides four routes of configurable output dry contact signals.
- Dry contact extended card (MUE07A): provides five routes of input signals and five routes of output signals.

Item	Description
MUE05A connection	Specifies the MUE05A connection status. Independent input signals can be enabled only when this parameter is set to **Enable**.
Batter ground fault [BTG]	Enable or disable battery grounding fault detection.
D.G. connection [GEN]	Enable or disable D.G. connection detection.
BCB connection [OL]	Enable or disable BCB connection detection.
Battery breaker [STA]	Enable or disable battery circuit breaker status detection.
PDC output breaker [OUT]	Enable or disable PDC output circuit breaker status detection.
PDC maintenance breaker [MT]	Enable or disable PDC maintenance circuit breaker status detection.
BP/SYSMT Switch	If the BP/SYSMT switch is set to **Enable**, the port has dry contact signal access. Using the port depends on the status of the BP/SYSMT switch.
BP/SYSMT switch function	If the BP/SYSMT switch is set to **Enable**, this parameter is displayed on the screen. Set this parameter to determine whether the port is used to detect the status of the PDU bypass input switch, or

Item	Description
	system maintenance switch.
SPD/SYSOUT Switch	If the SPD/SYSOUT switch is set to **Enable**, the port has dry contact signal access. How a user uses the port depends on the status of the SPD/SYSOUT switch.
SPD/SYSOUT switch function	If the SPD/SYSOUT switch is set to **Enable**, this parameter is displayed on the screen. Set this parameter to determine whether the port is used to detect the status of the PDU input surge protector, or system output switch.
MUE06A connection	Specifies the MUE06A connection status. If this parameter is set to **Enable**, the mains and bypass backfeed protection is enabled.
MUS05A DO_1 Action, MUS05A DO_2 Action, MUS05A DO_3 Action, MUS05A DO_4 Action	Controls the status of DO ports on the MUS05A dry contact card.
MUE07A DO_1 Action, MUE07A DO_2 Action, MUE07A DO_3 Action, MUE07A DO_4 Action, MUE07A DO_5 Action	Controls the status of DO ports on the MUE07A extended dry contact card.
MUS05A DO_1, MUS05A DO_2, MUS05A DO_3, MUS05A DO_4	Corresponds to the signal of the output dry contact DO on the MUS05A.
MUE07A DO_1, MUE07A DO_2, MUE07A DO_3, MUE07A DO_4, MUE07A DO_5	Corresponds to the signal of the output dry contact DO on the MUE07A.
MUE07A DI_1, MUE07A DI_2, MUE07A DI_3, MUE07A DI_4, MUE07A DI_5	Corresponds to the signal of the input dry contact DI on the MUE07A.

User Settings

Figure 4-33 User settings 1

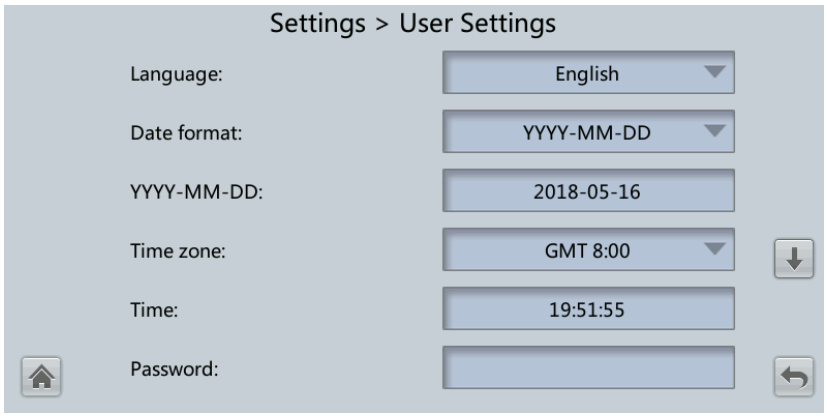
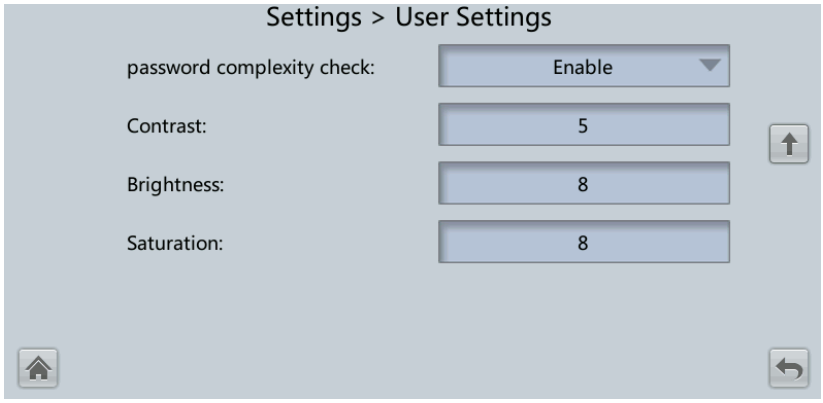


Figure 4-34 User settings 2



Item	Description	Default Value	Value Range
Language	Twelve languages are supported	English	English, Chinese, Spanish, Dutch, French, German, Italian, Polish, Portuguese, Russian, Swedish, Turkish
Password	-	000001	-
password complexity check	If the password complexity check is disabled, the user password is required to be a string of six to eight digits. If the password complexity check is enabled, the	Enable	Disable, Enable

Item	Description	Default Value	Value Range
	password is required to be a string of 6–20 characters and contain at least two types of characters.		

4.1.2.5 Maintenance

On the **System Info** screen, tap  to display the **Maintenance** screen.

Figure 4-35 Maintenance 1

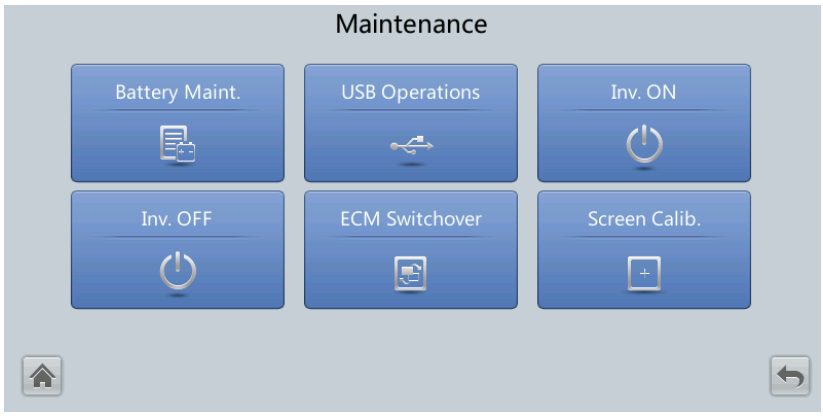
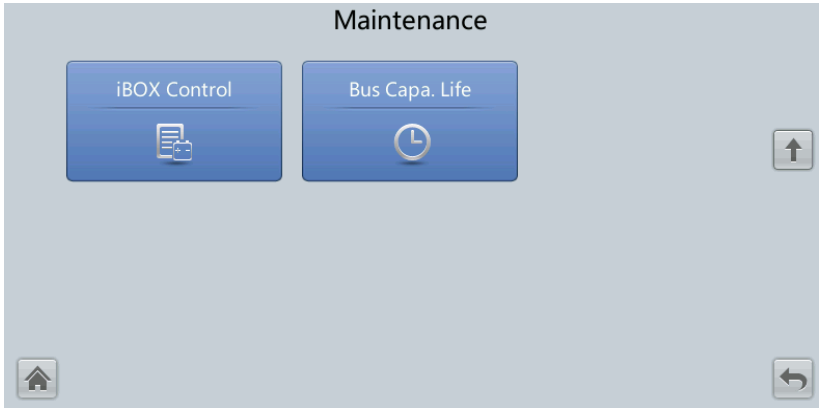


Figure 4-36 Maintenance 2



NOTE

- On the **System Info** > **Settings** > **iBOX Settings** > **Basic Param.** screen, if the **Number of iBOXs** is not **0** the **Maintenance** is displayed on the **iBOX Control** screen.
- Choose **Monitoring** > **System Settings** on the WebUI, if the **Bus capa. life** is set to **Enable**, the **Maintenance** is displayed on the **Bus Capa. Life** screen.

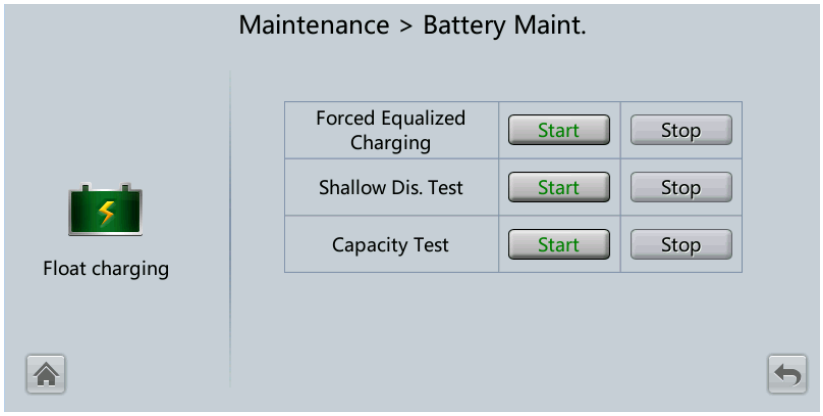
Battery Maint. screen

NOTICE

- Perform battery maintenance when no alarm is active on the UPS. Otherwise, the UPS may supply no power.
- A proportion of battery capacity will discharge during battery maintenance. This reduces the discharge time before the next charge.
- Do not perform battery maintenance when a D.G. is connected.

Battery maintenance includes **Forced Equalized Charging**, **Shallow Dis. Test**, and **Capacity Test**.

Figure 4-37 Battery Maint. screen

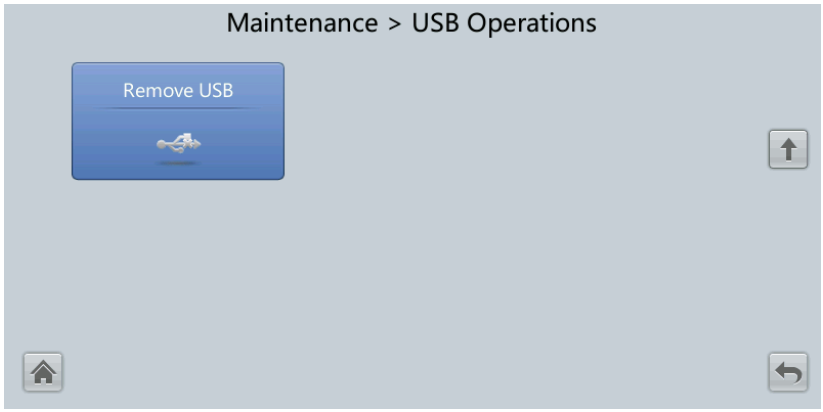


Item	Description
Forced Equalized Charging	Forcibly perform equalized charging on batteries.
Shallow Dis. Test	Partially discharge batteries. A shallow discharge test can be conducted to test the battery loop reliability and short-time discharge capacity when the batteries have not discharged for a long time.
Capacity Test	Fully discharge batteries. A deep discharge test is conducted to obtain the battery discharge performance data.

USB Wizard

Figure 4-38 USB wizard 1

Figure 4-39 USB wizard 2



Starting or Shutting Down the Inverter

Item	Description
Inv. ON	The **Inv. ON** screen allows you to start the inverter manually.
Inv. OFF	The **Inv. OFF** screen allows you to shut down the inverter manually.

ECM Switchover

NOTICE

- Only professional personnel are allowed to use this function.
- Clear faults before performing ECM active/standby switchover.
- After an ECM is inserted, active and standby switchover is supported only after the ECM is configured and starts working properly (about 30 seconds).

If the ECM to be maintained is still working, perform ECM active/standby switchover on this screen (a dialog box is displayed for you to confirm this operation). After performing active/standby switchover, ensure that this ECM is in standby state (that is, the green indicator is blinking) and then maintain the ECM.

iBOX control

Reset the specified iBOX and iBAT, and sets the iBAT blinking function or measures the iBAT internal resistance.

Item	Description
Reset	Restart an iBAT or an iBOX.
Blink	Make the red indicator on the iBAT start or stop blinking super fast.
Internal resistance	Measure the battery internal resistance. If the condition for measuring internal resistance is met (batteries are fully charged), you can tap **Measure** to start measuring the internal resistance of the selected iBAT in an iBOX. **NOTE** The interval between two measurement operations must be greater than 10 minutes.

Bus capacitor life forecast

If the service life of a capacitor is about to end, that is, **Module X bus capacitor life (y)** is less than 1.0, contact Huawei technical support to replace the power module.

4.1.2.6 About Screen

On the **System Info** screen, tap **About** to view the UPS model, manufacturer name, monitoring version and power version, as shown in Figure 4-40. To view version details, tap **Version Info**.

Figure 4-40 About screen

4.1.3 Main Menu

NOTICE

User interfaces displayed in this document correspond to the MDU version V300R001C95SPC600 and are for reference only.

The LCD screen is divided into three parts: status bar, alarm bar and information area. Figure 4-41 numerically labels functions of the default main screen, and Table 4-11 describes these functions.

Figure 4-41 Main Menu screen

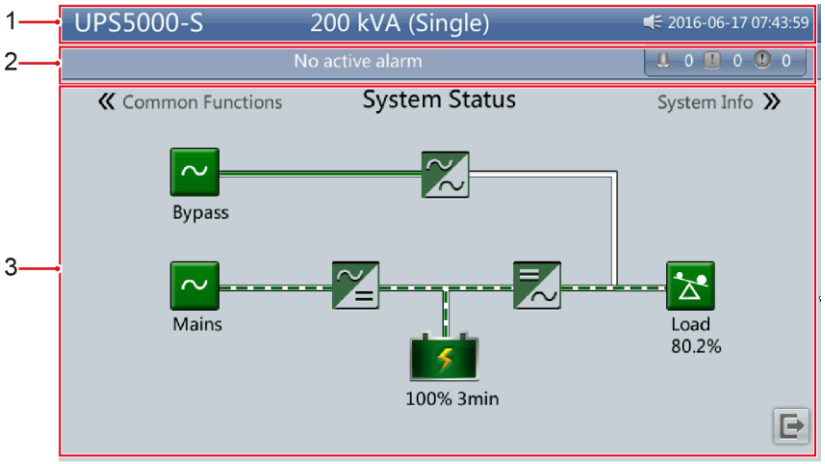


Table 4-11 Main screen description

Number	Area	Function
1	Status bar	Displays the UPS model, capacity, configuration, current date and time, USB flash drive status, and buzzer status.

Number	Area	Function
2	Alarm bar	Displays active alarms in a scrolling list and the number of active alarms based on severity. Tap the alarm icon area to open the active alarm page.
3	Information area	Displays the power flow as well as key information such as load and battery information. Tap the **Bypass**, **Mains**, **Battery**, and **Load** icons to view details.

Table 4-12 describes the functions of common buttons.

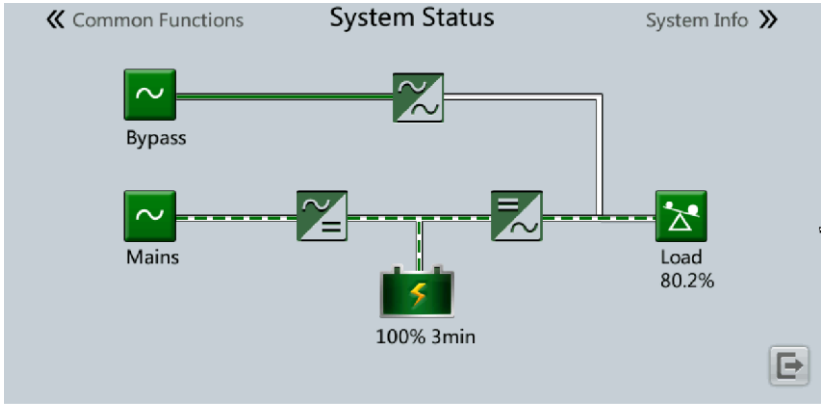
Table 4-12 Functions of common buttons

Button	Function
	Returns to the main screen.
	Scrolls the page down.
	Scrolls the page up.
	Returns to the upper-level menu.
	Logs a user out.

4.1.4 System Status

On the **System Status** to view the mains input, bypass input, load, and battery information.

Figure 4-42 System status



4.1.5 Common Functions

Figure 4-43 Common functions 1

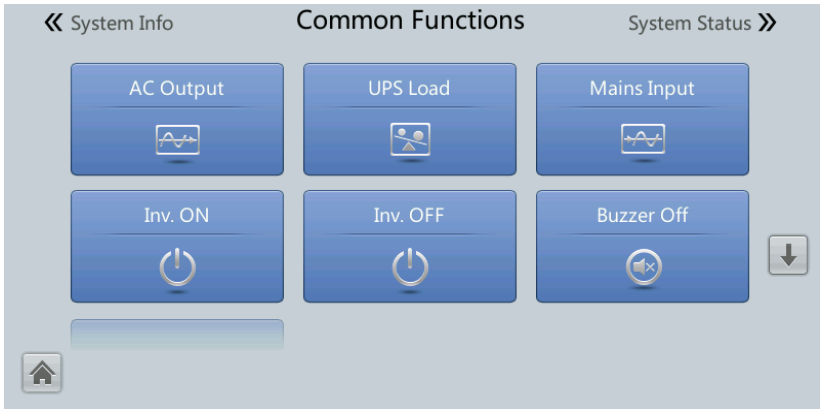
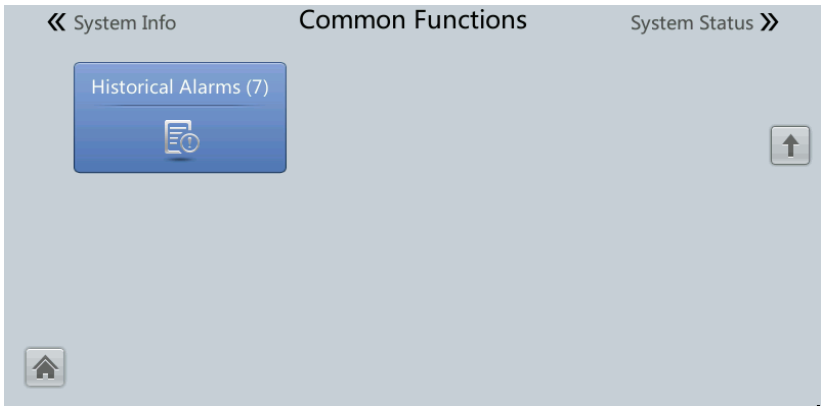


Figure 4-44 Common functions 2



4.2 WebUI

4.2.1 Login

Context

Internet Explorer 11 is used as the example browser.

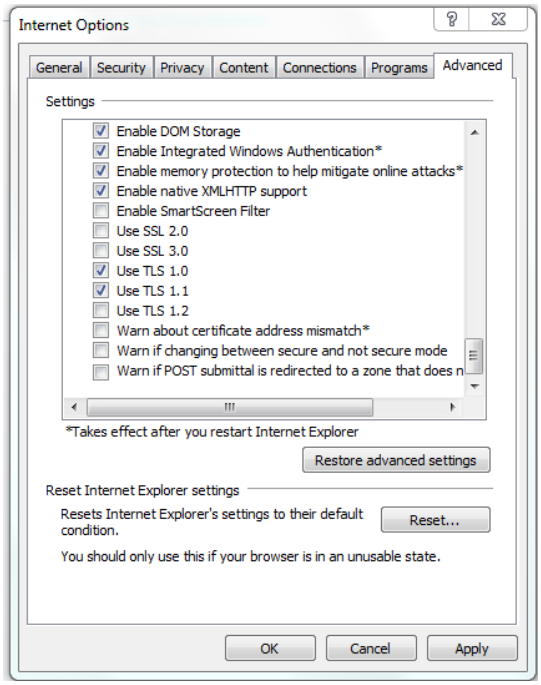
The system supports Internet Explorer 11 and Firefox 31.0.

Procedure

Step 1 Open the browser and choose **Tools** > **Internet Options**.

Step 2 On the **Advanced** tab page, ensure that **Use TLS 1.0**, and **Use TLS 1.1** are selected and click **OK**.

Figure 4-45 Settings in the Internet Options dialog box



Step 3 Enter **https://*UPS IP address*** in the address box of the browser, select a language, set **User name** and **Password**, and click **Login**.

NOTE

The preset UPS IP address is 192.168.0.10. You can set the UPS Ethernet IP address on the LCD or WebUI. The value range is 1.0.0.0–223.255.255.255.

Table 4-13 User description

Default User	Preset Password	User Rights
admin (system administrator)	Changeme	Performs all operations on the LCD and WebUI, including system running information browsing, system information exporting, parameter setting, system control, system configuration, and system maintenance.
operator (common user)	Changeme	Only browses the system running information, exports system information, starts/shuts down the inverter, rectifies faults, and controls the buzzer. Other control and maintenance functions that may affect system operation are invisible and parameters cannot be set.
browser (browsing user)	-	Only browses the system running information.

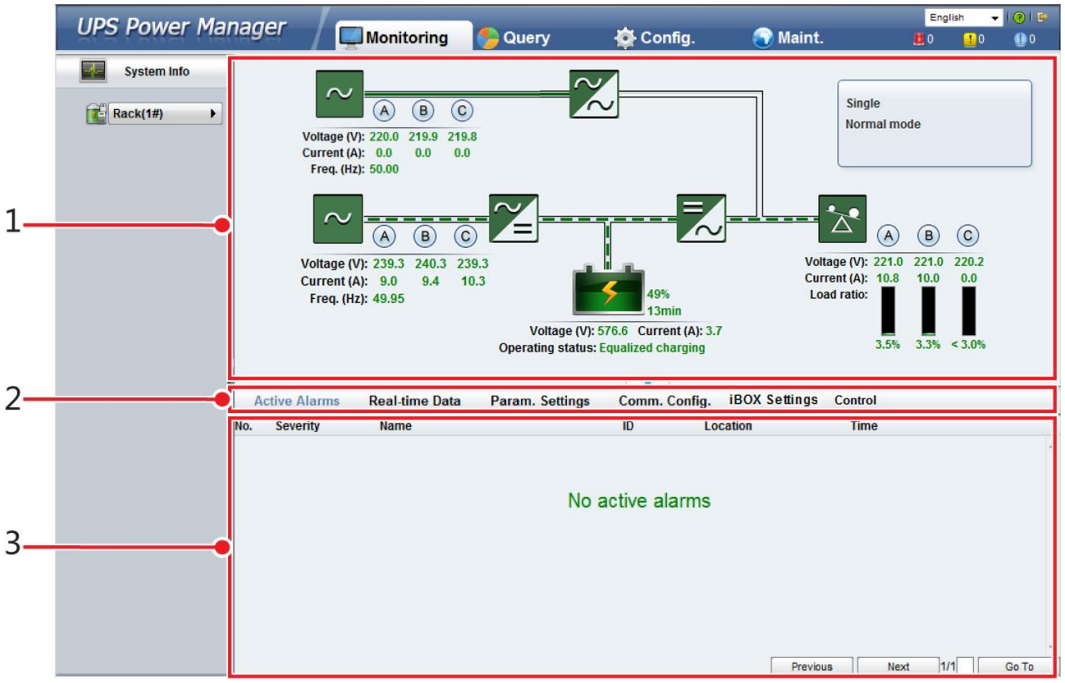
NOTE

- If an incorrect password is entered three consecutive times, the account will be logged out for 5 minutes.
- After a user logs in to the WebUI, if another user logs in with the same user name, the current account will be logged out.
- It is advised to change the password after the first login using **User Mgmt.** on the **Config.** page to prevent unauthorized access.

----End

4.2.2 Monitoring

Figure 4-46 Monitoring



NOTE

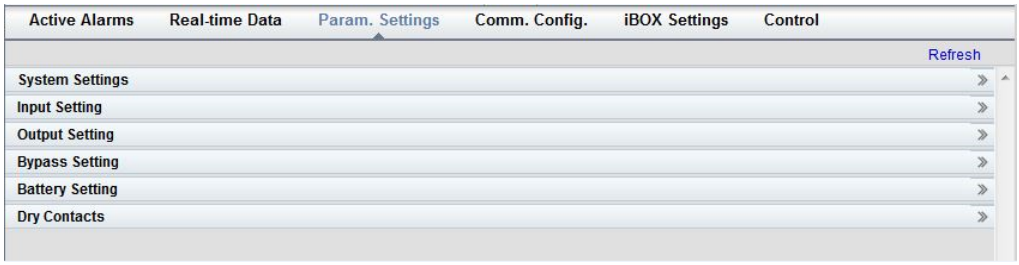
If **NA** is displayed for load ratio, the value is invalid or outside the range.

Table 4-14 Monitoring details

Number	Area	Function
1	Running status area	Displays the power flow and UPS running information.
2	Menu bar	Displays alarms and real-time data, sets parameters, and provides control commands. The **Active Alarms** page is displayed by default.
3	Information area	Displays system monitoring information.

4.2.2.1 Parameter Settings

Figure 4-47 Parameter settings



System Settings

Item	Description	Default Value	Value Range
High ambient temperature alarm threshold (°C)	An alarm is generated when the ambient temperature reaches or exceeds the threshold specified by this parameter.	55	40–60
Low ambient temperature alarm threshold (°C)	An alarm is generated when the ambient temperature is lower than the threshold specified by this parameter.	–10	–20 to 0
EPO detection	Indicates whether to enable emergency power-off (EPO). EPO is performed only when this parameter is enabled and the EPO switch is triggered. When **EPO detection** is changed from **Disable** to **Enable**, check that the EPO cable is connected correctly.	Enable	Disable, Enable
Bus capa. life	If this parameter is set to **Enable**, the UPS detects the bus capacitor lifespan.	Disable	Disable, Enable
Paral. sys. hibernate	When customer loads are light, enable parallel hibernation to alternate modules in hibernation mode, which can prolong their service life and improve the system efficiency.	Disable	Disable, Enable
Module cycle hiber. period (d)	Indicates the rotation interval of modules in hibernation mode. The default value is 30, which means that the hibernating	30	1–100

Item	Description	Default Value	Value Range
	module is rotated every 30 days.		
D.G. ECO bypass supply	Indicates whether ECO bypass is allowed to supply power in D.G. mode. When the D.G. is connected to the dry contact signal GEN: • If this parameter is set to **Enable**, the system can enter ECO bypass mode when the D.G. supplies power to the bypass and the ECO function is enabled. • If this parameter is set to **Disable**, the system is not allowed to enter ECO mode when the D.G. supplies power to the bypass.	Enable	Disable, Enable
RAM verification	Enable or disable the memory check function. If this parameter is set to **Enable**, the control chip RAM working status is checked regularly. If this parameter is set to **Disable**, regular check is disabled.	Disable	Disable, Enable
Record time after fault	Indicates the time for storing fault data after the UPS experiences a fault. The default value is 0 ms, which means that the data during 20 ms before the fault occurs is recorded. If the value is set to 40 ms, it means that the data during 20 ms before the fault occurs and the data during 40 ms after the fault occurs are recorded, and the like.	0 ms	0 ms, 20 ms, 40 ms, 60 ms, 80 ms
Collect real-time site waveform	If this parameter is set to **Enable**, one waveform can be stored manually.	Disable	Disable, Enable
BCB trips in case of EOD	If this parameter is set to **Enable**, the BCB will trip in case of EOD.	Enable	Disable, Enable

Input Settings

Item	Description	Default Value	Value Range
Input	The value of **Input adaptability**	Strong	Strong, Weak

Item	Description	Default Value	Value Range
adaptability	can be **Strong** or **Weak**. Strong input adaptability applies to the D.G. or input sources whose input current has high frequency oscillation. In this mode, the total distortion of the input current waveform (THDi) is poor, but the system is stable. Weak input adaptability is suitable for mains and AC input sources.		

Output Settings

Item	Description	Default Value	Value Range
Zero display with no load output	If this parameter is set to **Enable**, the output current is displayed as 0 when no load is output. The output load rate is displayed as 3%. When this parameter is set to **Disabled**, the output current and output load rate are not adjusted to zero.	Enable	Disable, Enable
Calib. output current if no load	If this parameter is set to **Enable**, the current at no load will be calibrated once automatically. This function can be used only when the UPS carries no load.	Disable	Disable, Enable
Output interruption transfer time (ms)	Set this parameter based on the output interruption time acceptable to loads.	0	0 ms, 40 ms, 60 ms, 80 ms, 100 ms, 120 ms
Max. BPM transfer times	Cross currents occur during the transfer between bypass mode and normal mode, which impacts the system. This parameter specifies the number of transfers between bypass mode and normal mode within 1 hour, which ensures system security.	5	1–10
Current equal. detection	Monitors the current differences between racks or modules. If this parameter is set to **Enable**, the **Mod. Cur. Eql. Data** can be viewed on the running information screen.	Disable	Disable, Enable
Inverter async.	Specifies whether an **Inverter asynchronous** alarm can be	Disable	Disable, Enable

Item	Description	Default Value	Value Range
alarm	displayed on the LCD when the inverter cannot track the bypass frequency change. Normal power supply is not affected no matter whether this parameter is set to **Enable** or **Disable**.		
Bus overvoltage recovery	Specifies whether to automatically clear the alarm and restart the power module when the rectifier or inverter shuts down due to a bus overvoltage alarm. If **Bus overvoltage recovery** is set to **Enable**, the bus overvoltage alarm is automatically cleared, and the rectifier and inverter automatically start when the bus voltage recovers (less than 420 V) within **Bus overvolt. recovery time**. When **Bus overvoltage recovery** is set to **Disable**, the bus overvoltage alarm cannot be automatically cleared, and the rectifier and inverter cannot automatically start.	Enable	Disable, Enable
Bus overvolt. recovery time	If **Bus overvoltage recovery** is set to **Enable**, the bus overvoltage alarm is automatically cleared, and the rectifier and inverter automatically start when the bus voltage recovers (less than 420 V) within **Bus overvolt. recovery time**.	5s	5s, 1 min, 5 min, 10 min
Capacitor failure detection	If **Capacitor failure detection** is set to **Enable**, the power module (power unit) performs inverter capacitor fault detection based on the settings of **Capacitor failure detection upper limit** and **Capacitor failure detection lower limit**. If the power module determines that the inverter capacitor is faulty, it shuts down the inverter to prevent the fault from expanding.	Disable	Disable, Enable

Bypass Settings

Item	Description	Default Value	Value Range
BPM mode upon BPM overtemp.	Specifies whether to start bypass mode when overtemperature occurs.	Enable	Disable, Enable
Lightload BPM cur. eql. detect	Enable or disable the light load bypass current imbalance alarm. If this parameter is set to **Enable**, the load is light (less than 30% load), and the load rate of a certain rack is less than 10%, the system will generate a bypass current imbalance alarm and cannot enter the ECO mode. If this parameter is set to **Enable**, the preceding detection is not performed. Whether the bypass current is imbalanced does not affect the ECO bypass mode.	Enable	Disable, Enable

Battery Settings

NOTICE

Battery parameter settings impact battery maintenance, battery lifespan, and UPS discharge time. When you set battery parameters, note the following:

- Retain default settings for **Chg. cur. limiting coef.** and **Cell float voltage**. Only professional maintenance personnel are allowed to change the settings.
- When you set parameters, ensure the following: **Chg. cur. limiting coef.** > **Transfer-to-equalized charging cur. coef**.
- **Single batt. float chg. voltage deviation alarm thres.** and **Single batt. dis. voltage deviation alarm thres.** are used to check whether the batteries in each battery string have the same charge voltage and discharge voltage. When a value exceeds the specified range, an alarm is generated. The calculation formula is (Charge/Discharge voltage – Average voltage)/Average voltage x 100%. The charge/discharge voltage and average voltage are obtained from the BMU. If the BMU is not configured, these two parameters do not need to be set.

Item	Description	Default Value	Value Range
Float volt. temp. comp.	If this parameter is set to **Enable**, the float voltage is calibrated based on the battery temperature when a battery temperature sensor is connected. The parameter is configurable in any mode.	Enable	Disable, Enable

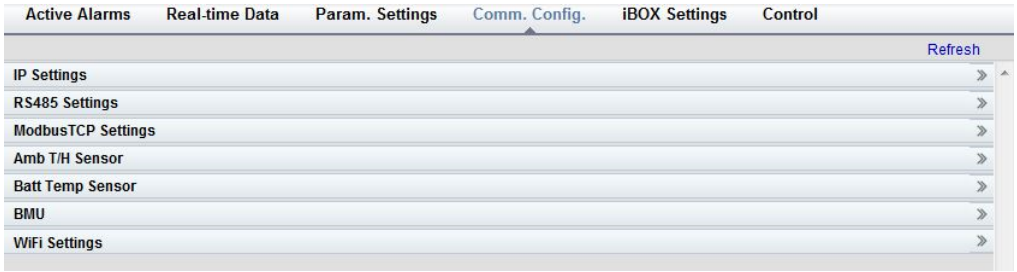
Item	Description	Default Value	Value Range
Float volt. temp. comp. coef. (mV/°C·cell)	Calibration coefficient during float voltage temperature compensation.	3.3	0.0–6.0
Float Chg temp comp center (°C)	Indicates the reference temperature during temperature compensation of the float charging voltage.	25	20–30
Automatic equalized charging	If this parameter is set to **Enable**, the UPS automatically changes the battery management status to equalized charge based on the charge current and float charge time.	Enable	Disable, Enable
Transfer-to-equalized charging cur. coef. (C10)	The battery enters equalized charge state when the battery current exceeds this parameter value.	0.05	0.02–0.08
SOC to start equalized charging (%)	If the SOC is lower than the specified value, batteries start equalized charging.	70	0–100
Scheduled equalized charging interval (d)	After batteries transfer from equalized charging to float charging, if the batteries do not discharge, equalized charging starts only after the float charging time reaches **Equalized charging protection interval**. After equalized charging is complete, scheduled equalized charging starts when the non-equalized charging time exceeds **Scheduled equalized charging interval**.	60	30–180
Equalized charging protection interval (d)		7	0–15
Forced equalized charging protection time (h)	When batteries are continuously under float charging or hibernation, enable forced equalized charging. When the forced equalized charging time reaches the value of this parameter, batteries automatically transfer to float charging mode.	18	12–24
Max. batt. dis. time (h)	Set the maximum battery discharge time. When the discharge time reaches this value, the UPS powers off. The battery discharge time can be set only to	24	0–48

Item	Description	Default Value	Value Range
	0 hours or a value only in the range of 16–48 hours. If the time is set to 0 hours, battery discharge protection is not implemented.		
EOD restart	If the mains is not functioning normally, the UPS will transfer to battery mode. When batteries reach the EOD threshold, the bypass is disabled, and **EOD restart** is **Enable**, the UPS will restart as soon as the mains resumes. If **EOD restart** is disabled, clear the alarm manually or enable the restart function for the UPS.	Enable	Disable, Enable
EOD restart delay (min)	If **EOD restart** is set to **Enable**, the UPS starts working after the time set for **EOD restart delay** when the input recovers from the power failure upon EOD.	10	1–1440
Undertemp. alarm thresh. (°C)	Battery temperatures can be monitored in a timely manner. If a battery overtemperature alarm is detected, the charging current limit decreases to 0.03 CA. Battery charging stops if a battery overtemperature protection alarm (when the temperature reaches the high temperature threshold plus 3°C) is generated.	–5°C	–20°C to +5°C
Overtemp. alarm thresh. (°C)		50°C	35°C to 55°C
Single batt. float chg. voltage deviation alarm thres. (%)	**Single batt. float chg. voltage deviation alarm thres. (%)** and **Single batt. dis. voltage deviation alarm thres. (%)** are used to check whether the cells in each battery string have the same charge voltage and discharge voltage. When a value exceeds the specified range, an alarm is generated. The calculation formula is (Charge/Discharge voltage – Average voltage)/Average voltage x 100%.	10	5–30
Single batt. dis. voltage deviation alarm thres. (%)		20	10–30
Batt. charging capacity mismatch	After this function is enabled, an alarm is generated if the configured battery capacity	Disable	Disable, Enable

Item	Description	Default Value	Value Range
	exceeds the charging capacity of the rack.		
Bat mode shut	In battery mode, the UPS can automatically power off according to the preset shutdown delay time. If the parameter is disabled, this function is not available.	Disable	Disable, Enable
Backup time warning	An alarm is generated if this parameter is set to **Enable** and the backup time is less than the warning threshold.	Disable	Disable, Enable
Remain. cap. warning	An alarm is generated if this parameter is set to **Enable** and the remaining capacity is less than the warning threshold.	Disable	Disable, Enable
Intelligent hibernation	If this parameter is set to **Enable**, the intelligent battery hibernation function is enabled.	Disable	Disable, Enable
Thres. of low batt. SOC over dry contact (%)	If an output dry contact is set to **Low battery SOC**, and the battery SOC is lower than this threshold, the output dry contact will output signals.	75	5–80
Thres. of low batt. volt. over dry contact (V/cell)	If an output dry contact is set to **Batt. Volt. Below Threshold**, and the battery voltage is lower than this threshold, the output dry contact will output signals.	1.70	1.70–2.10

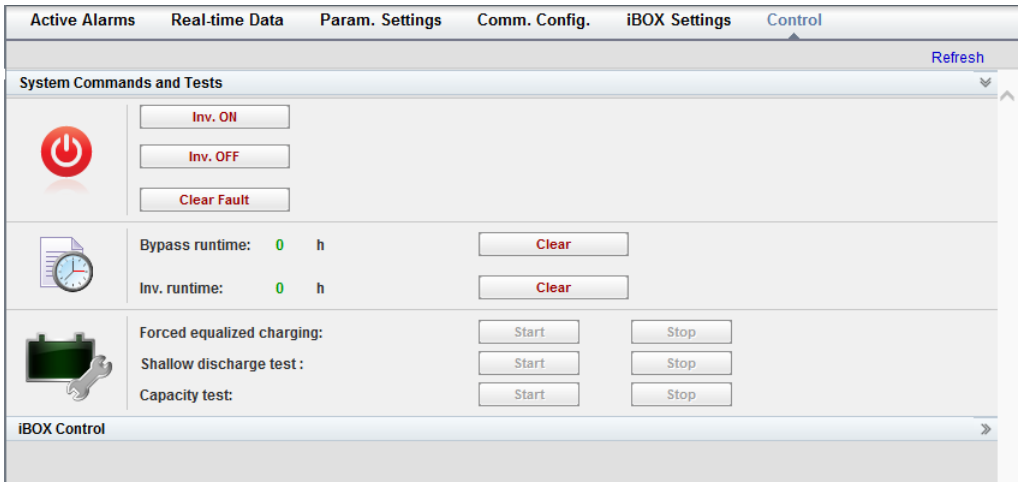
4.2.2.2 Communication Settings

Figure 4-48 Communication settings



4.2.2.3 Control

Figure 4-49 Control

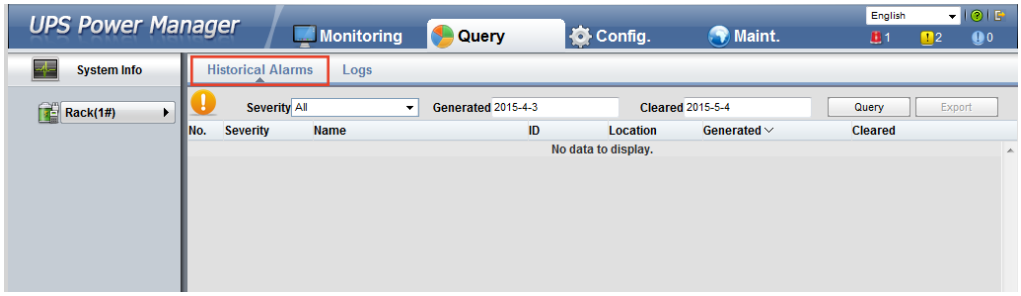


4.2.3 Query

4.2.3.1 Historical Alarms

On the homepage, click the **Query** tab to open the **Historical Alarms** page for querying historical alarms based on severity, generation time, and clear time.

Figure 4-50 Historical alarms



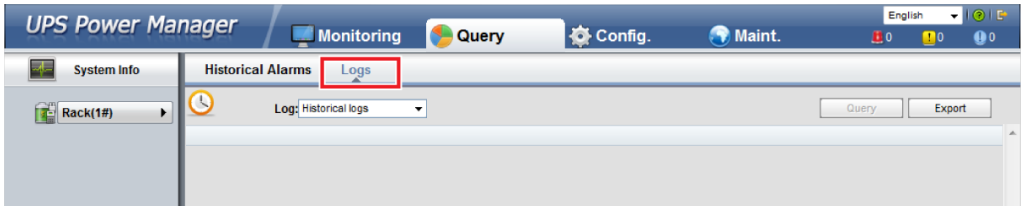
4.2.3.2 Logs

On the **Logs** page, you can set **Log** to **Historical logs**, **Cap. test logs**, or **Common test logs**, and query or export logs.

NOTE

Historical logs can be exported but not queried.

Figure 4-51 Logs

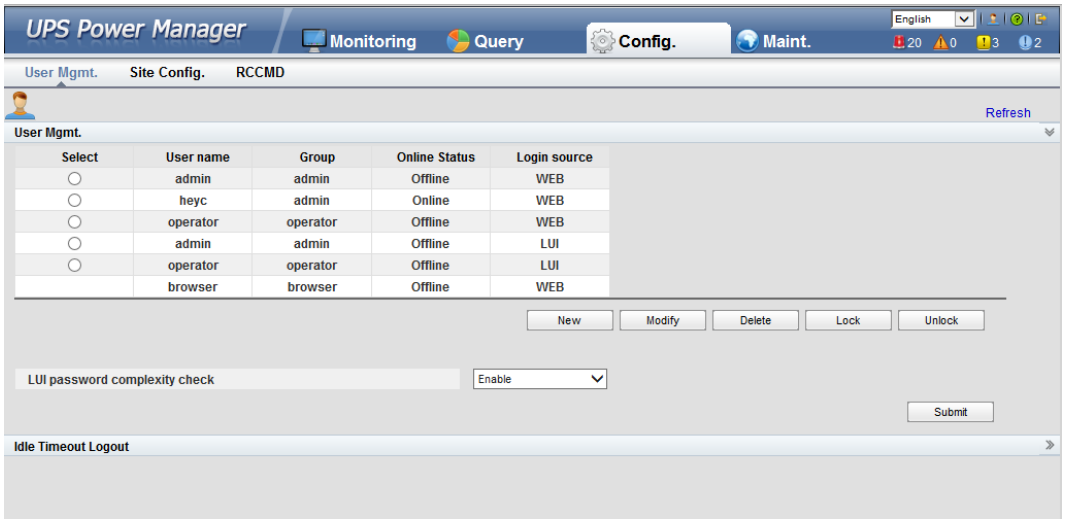


4.2.4 Config.

4.2.4.1 User Management

On the home page, choose **Config.** > **User Mgmt**.

Figure 4-52 User management



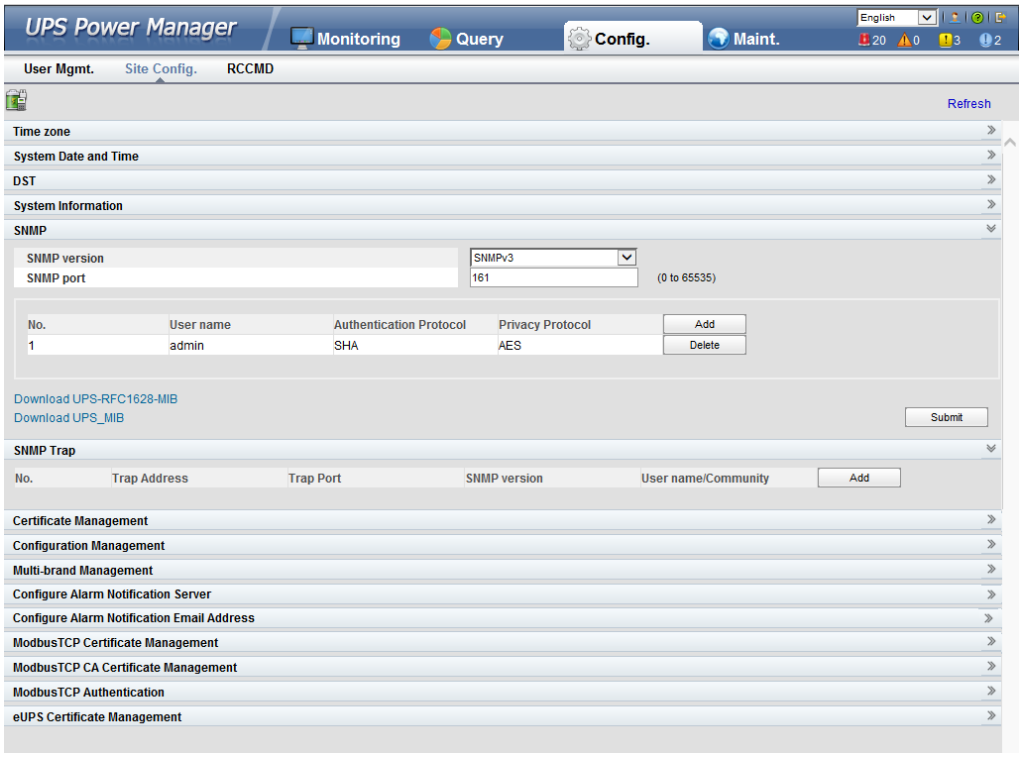
NOTE

- On the **User Mgmt.** page, you can add, modify, delete, lock, or unlock users and change user passwords.
- The WebUI user name cannot exceed 10 characters and can contain only uppercase and lowercase letters, digits, and underscores. The password contains 6 to 20 characters and at least two types of uppercase letters, lowercase letters, digits, and underscores.
- If the LUI password complexity check is disabled, the user password is required to be a string of six to eight digits. If the password complexity check is enabled, the user password is required to be a string of 6–20 characters and contain at least two types of characters.

4.2.4.2 Site Config.

On the home page, choose **Config.** > **Site Config**.

Figure 4-53 Site configuration



- The NTP parameters are used to set the NTP server address, port number, and synchronization interval.
- The default SNMP version is SNMPv3, and the preset MD5/SHA password is **Changeme1**, and the preset DES/AES password is **Changeme2**. Change the password after your first login, preventing unauthorized access.
- To obtain the MIB file, choose **Config.** > **Site Config.** > **SNMP** > **Download HUAWEI_UPS_MIB**.
- The **SNMP Trap** is used to set the IP address of a server on which the NMS software is installed. The trap port needs to be the same as that on the NMS. If **SNMP Trap** is incorrectly set or not set, system information will be lost or not reported in time.
- The certificate is used for Secure Sockets Layer (SSL) encryption protection for WebUI login. You need to apply to a third-party institution for the certificate.
- **Configuration Management** is used to upload and export configuration parameters in the monitoring system.
- **Multi-brand Management** is used to import the brand information of a partner to the corresponding WebUI.
- Specify **Email server IP address**, **Sender's email**, and **User account authentication required** when sending a mail and click **Test** to check whether the test email can be received. **Configure Alarm Notification Server** is used to configure a server for receiving alarm emails from the monitoring system.
- Set **Email** and **Alarm Severity** and simulate an alarm. Check that the alarm email can be received. **Configure Alarm Notification Email Address** is used to configure the email address for receiving alarm emails from the monitoring system.
- **ModbusTCP Certificate Management**: ModbusTCP supports the Transport Layer Security (TLS) secure protocol for encrypted transmission and implements access

authentication through the bidirectional certificate. Customers can replace the UPS certificate with the certificate trusted by them.

- **ModbusTCP CA Certificate Management**: Import a CA certificate to verify the validity of the ModbusTCP access certificate.
- **ModbusTCP Authentication**: Verify the identity legitimacy of both parties to ensure data security for both parties in ModbusTCP communication.
- After eUPS certificate management is configured, a certificate can be imported on the WebUI to replace the preset eUPS certificate.

4.2.4.3 RCCMD

RCCMD

RCCMD function is set to **Disable** by default, as shown in Figure 4-54. If required, set it to **Enable** upon first login. After you submit the setting, the page refreshes. The controls such as **SSL Encrypted Transmission** and **Event Configuration** will be displayed on the page, as shown in Figure 4-55.

Figure 4-54 RCCMD function disabled

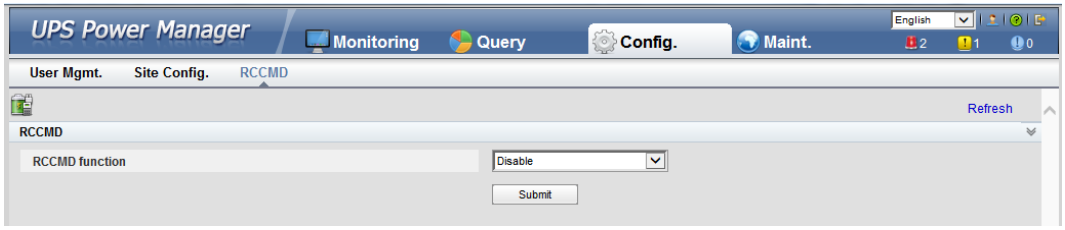
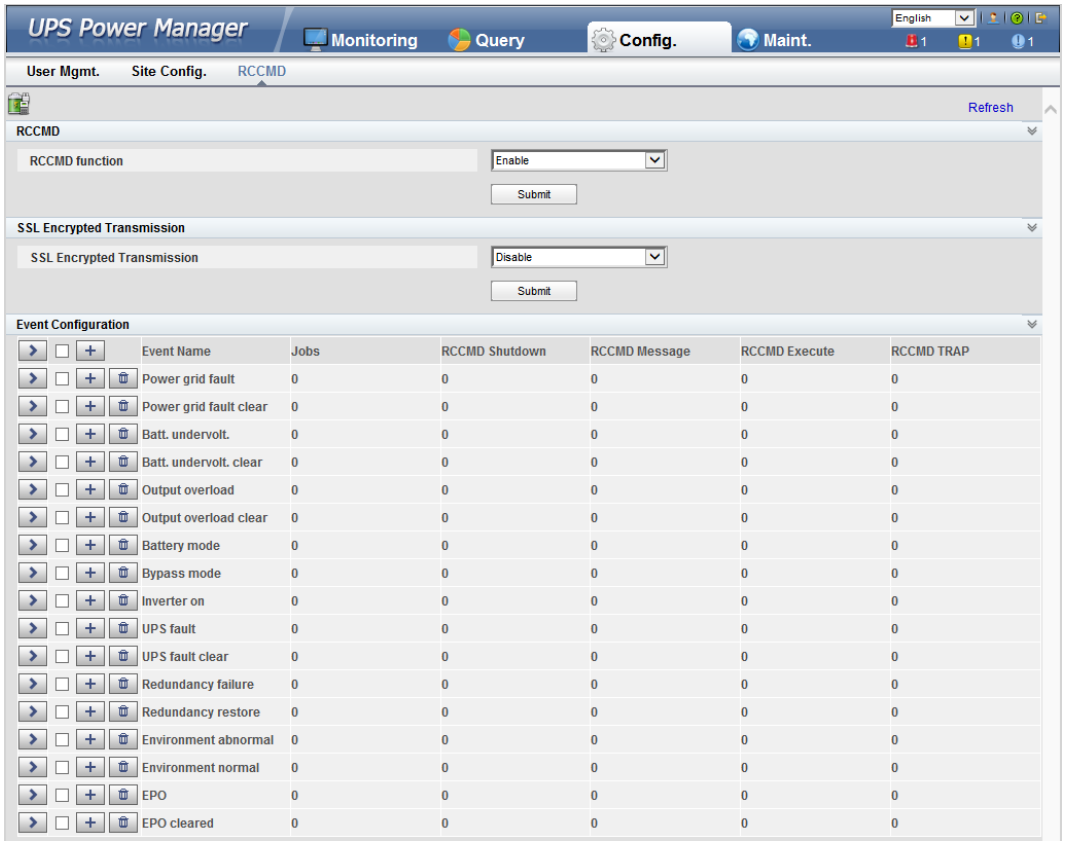


Figure 4-55 RCCMD function enabled



SSL Encrypted Transmission

NOTICE

The SSL encrypted transmission set on the page of the UPS5000 monitor display module (MDU) must be the same as the setting on the RCCMD client.

SSL Encrypted Transmission is set to **Enable** by default, as shown in Figure 4-56. If it is set to **Disable**, the RCCMD certificate controls will not be displayed on the page, as shown in Figure 4-57. If **SSL Encrypted Transmission** is set to **Disable**, a message indicating there is a risk will be displayed.

Figure 4-56 SSL encrypted transmission enabled by default

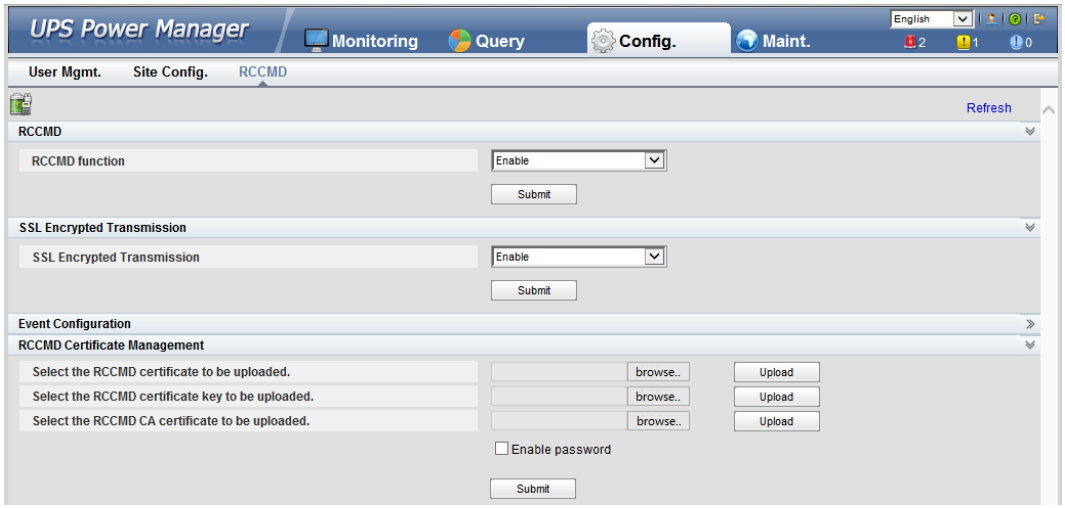
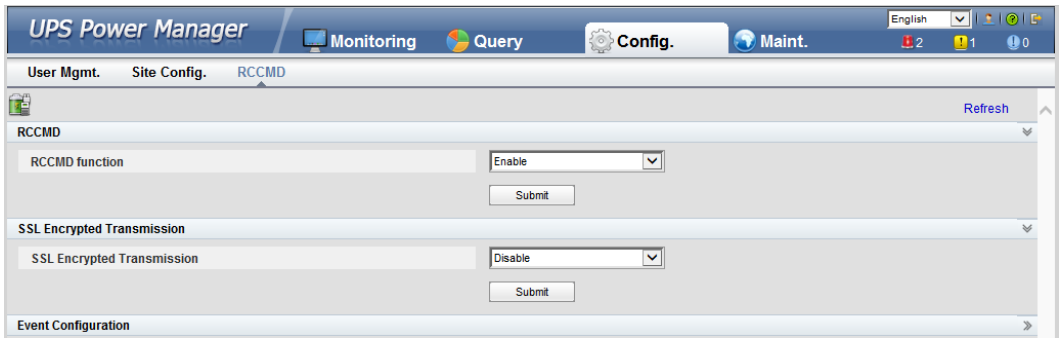


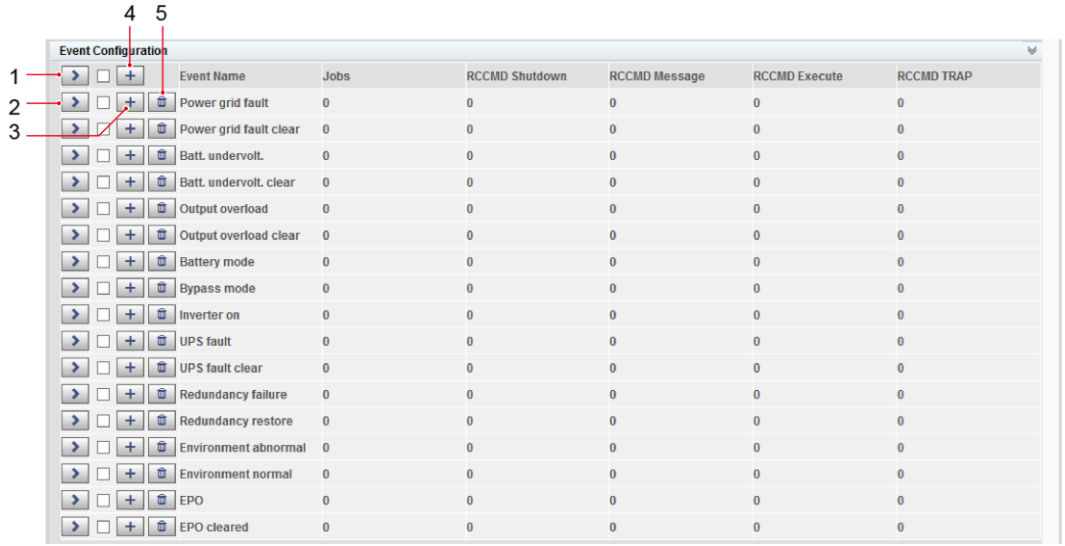
Figure 4-57 SSL encrypted transmission disabled



Event Configuration

The MDU supports 17 alarm events, and a maximum of 50 jobs can be added for each event, as shown in Figure 4-58. Figure 4-58 shows the buttons on the **Event Configuration** page, and Table 4-15 describes these buttons.

Figure 4-58 Event configuration page



NOTE

Number of jobs = Number of **RCCMD Shutdown** jobs + Number of **RCCMD Message** jobs + Number of **RCCMD Execute** jobs + Number of **RCCMD TRAP** jobs.

Table 4-15 Buttons on the event configuration page

No.	Name	Description
1	Button for expanding all	You can view all jobs of all events by clicking this button.
2	Button for expanding one event	You can view all jobs of the event by clicking this button.
3	Button for adding one job	You can add one job for the event by clicking this button.
4	Button for adding one job for events	Select multiple events, and you can add one job for the selected events at the same time by clicking this button.
5	Button for deleting all jobs	You can delete all jobs of the event by clicking this button.

Figure 4-59 shows the buttons after one event is expanded and Table 4-16 describes these buttons.

Figure 4-59 Buttons after one event is expanded

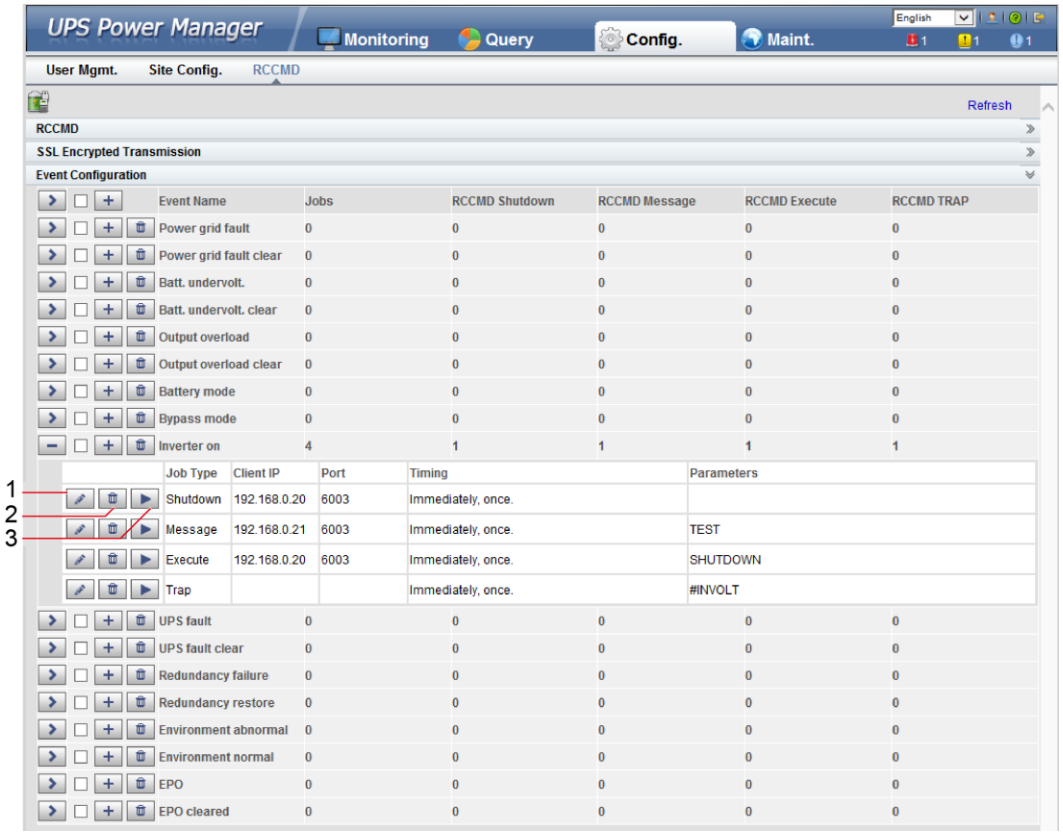


Table 4-16 Buttons after one event is expanded

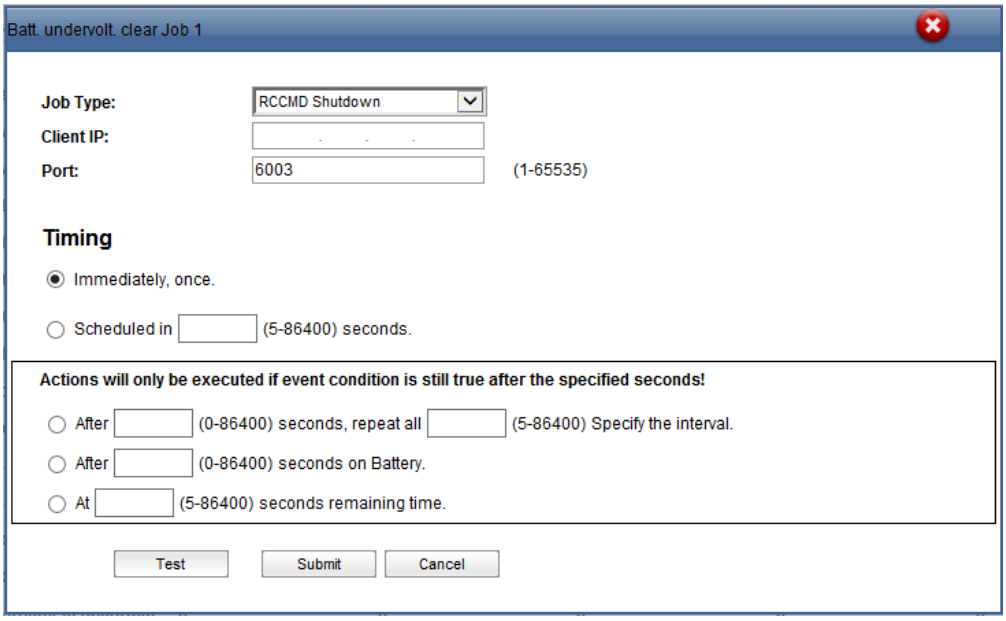
No.	Name	Description
1	Button for modifying	A dialog box for modifying a job is displayed after you click this button. You can modify the job.
2	Button for deleting one job	You can delete the job by clicking this button.
3	Button for test	If you click this button, the job will be performed and a message showing test succeeds or fails will be displayed on the page.

Adding one job for one event: Select one event (for example, **Inverter on**), click the button for adding one job, and the page for adding a job for the event is displayed.

When adding a job, the job types to be selected are: **RCCMD Shutdown**, **RCCMD Message**, **RCCMD Execute**, and **RCCMD TRAP**. **RCCMD Shutdown** is selected by default. For different job types, you need to enter different contents.

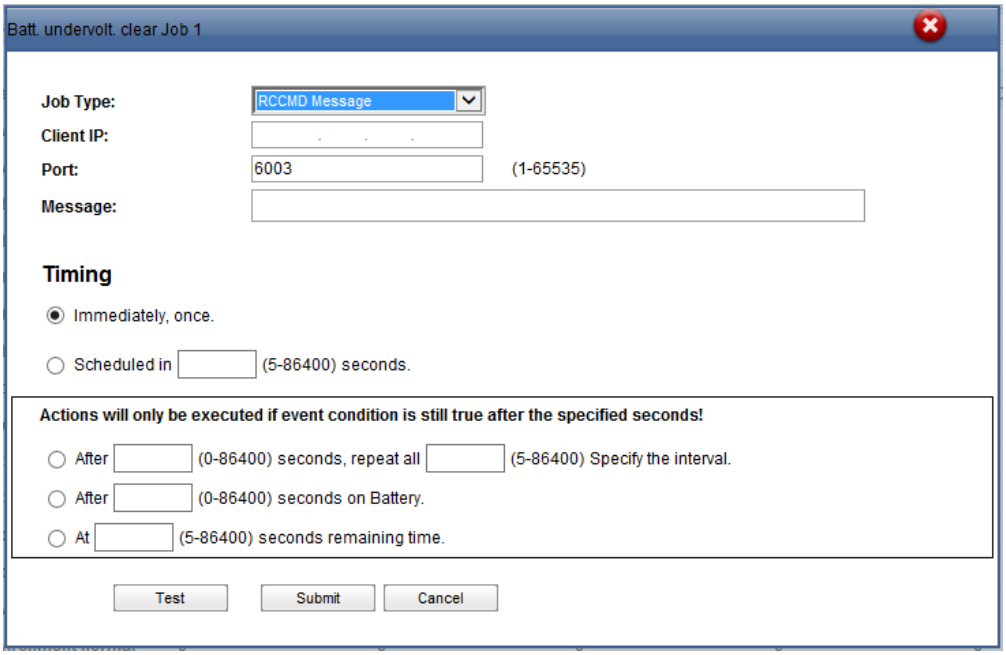
- **RCCMD Shutdown**: You need to specify the RCCMD client IP address and port. When the RCCMD client receives the job, it will shut down the computer.

Figure 4-60 RCCMD shutdown



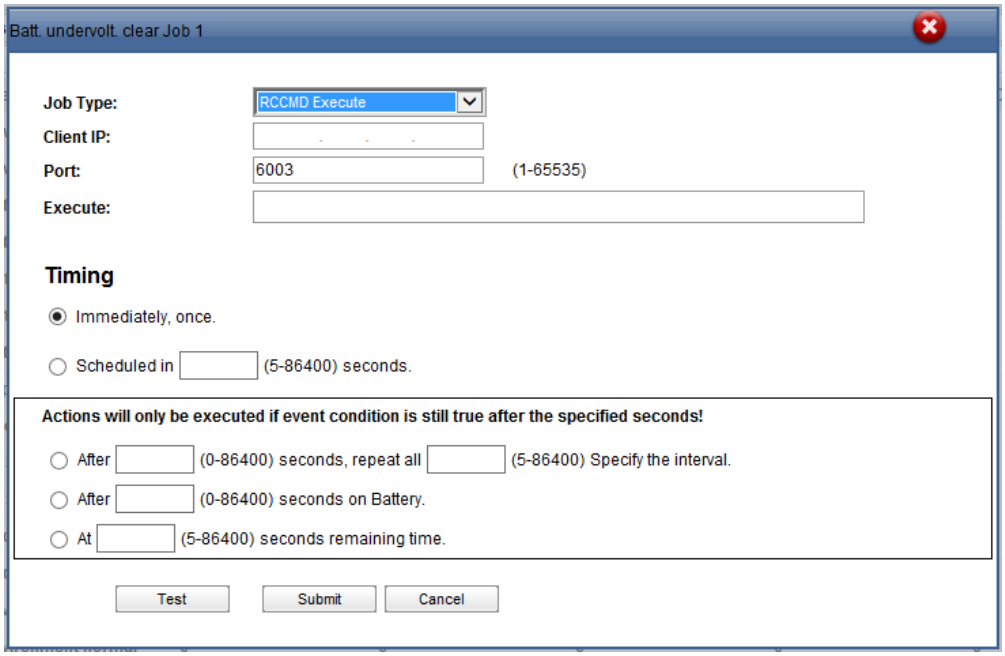
- **RCCMD Message**: Specify the RCCMD client IP address, port, and message to be conveyed. The RCCMD client will receive the message. For example, enter "This is a test message".

Figure 4-61 RCCMD message



- **RCCMD Execute**: Specify the RCCMD client IP address, port, and command to be executed. For example, enter **SHUTDOWN**, and the RCCMD client will shut down the computer after receiving the command.

  Figure 4-62 RCCMD execute



- **RCCMD TRAP**: When the event happens, the MDU will send the TRAP message to all connected RCCMD clients based on the sending mechanism.

  If you want to define the TRAP message by yourself, you can use the TRAP signal to display the UPS information. For example, if you enter **#INVOLT V**, the RCCMD client will receive the UPS input voltage value (for example, single-phase: 220 V; three-phase A: 220 V, B: 220 V, C: 220 V). Table 4-17 lists the signal names that can be entered.

Figure 4-63 RCCMD TRAP

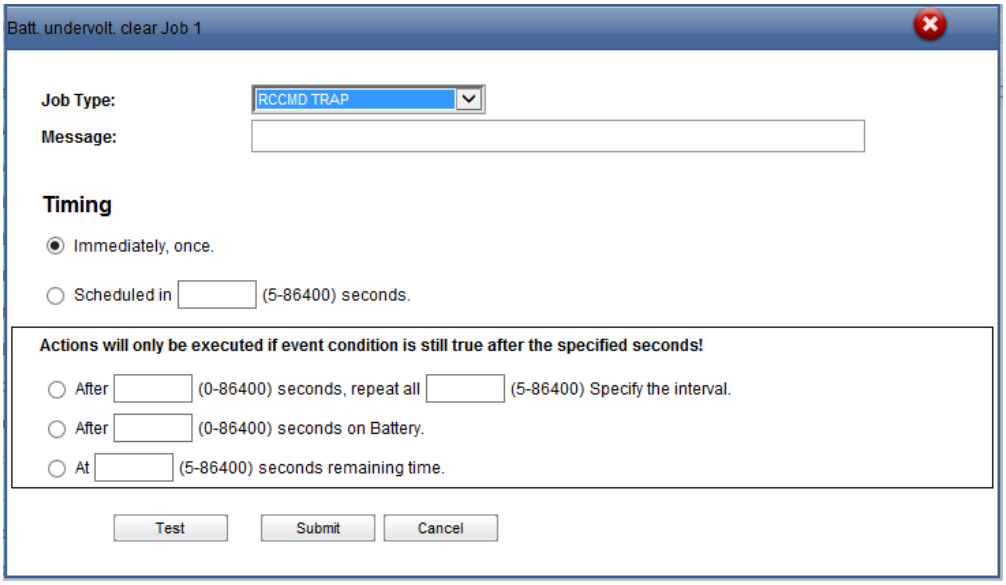


Table 4-17 RCCMD TRAP signal

Signal Name	Description	Unit in the UPS
#MODEL	Device name	N/A
#OUTPOWER	Active power	kW
#OUTVOLT	Output voltage	V
#OUTCURR	Output current	A
#OUTLOAD	Output load rate	%
#BATTCAP	Remaining battery capacity	%
#INVOLT	Input voltage	V
#BYPASSINVOLT	Bypass input voltage	V
#TEMPDEG	Temperature inside the UPS	Celsius
#AUTONOMTIME	Battery backup time	minutes
#STATUS	UPS status	N/A
#RUNTIME	UPS operating time	minutes
#BATTVOLT	Battery voltage	V
#INFREQ	Input frequency	Hz
#BYPASSINFREQ	Bypass input frequency	Hz
#OUTFREQ	Output frequency	Hz
#CNT_PF	Power supply failure times	N/A

Signal Name	Description	Unit in the UPS
#CNT_BL	Low battery voltage times	N/A
#INPHASES	Input phases	N/A
#OUTPHASES	Output phases	N/A

When you add a job, five sending methods are available. The latter three methods can take effect only when the event condition is still true after the specified seconds.

- **Immediately, once**: After the event happens, the job will be sent to the RCCMD client immediately.
- **Scheduled in X seconds**: After the event happens, the job will be sent to the RCCMD client once in X seconds. No matter whether the event disappears or not within X seconds, the job will be sent.
- **After X seconds, repeat all Y Specify the interval**: After the event happens, the job will be sent once in X seconds, and then be sent once every Y seconds.
- **After X seconds on Battery**: After the battery mode is activated for X seconds, the job will be sent to the RCCMD client once.
- **At X seconds remaining time**: When the battery backup time has only X seconds left, the job will be sent to the RCCMD client once.

NOTE

X and Y are variables and stand for time.

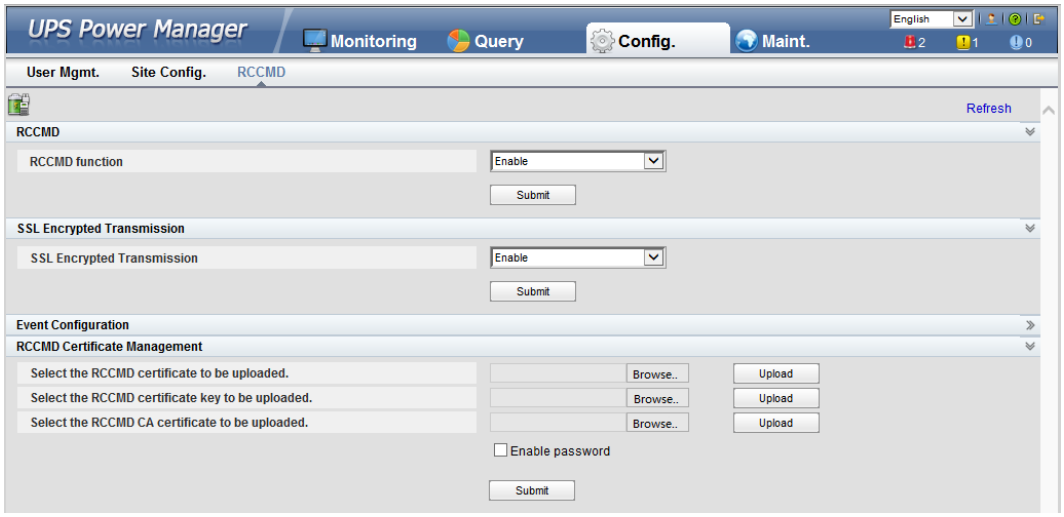
RCCMD Certificate Management

NOTICE

- After replacing the certificate on the MDU WebUI, replace the certificate on the RCCMD client too. Otherwise, communication will fail. For details about the replacing method, see the RCCMD user manual.
- The default certificate provided by the system has expired. Replace the certificate immediately.

After **SSL Encrypted Transmission** is set to **Enable**, **RCCMD Certificate Management** is displayed. The RCCMD certificate, RCCMD certificate key, and RCCMD CA certificate can be uploaded, as shown in Figure 4-64. If the RCCMD certificate or RCCMD CA certificate is not uploaded, the default certificate provided by the system is used for communication. After the certificate is uploaded successfully, click **Submit**. The WebUI of the MDU will restart, and the uploaded certificate will be used for communication.

Figure 4-64 RCCMD certificate management



NOTE

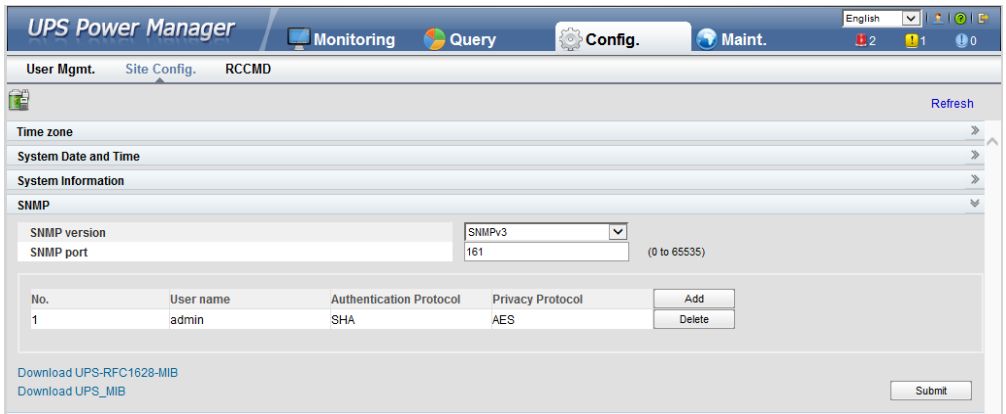
If the RCCMD certificate key has been encrypted, enable and enter the key password.

4.2.4.4 Managing the UPS by Using the NMS Complying with RFC1628 Standard

Installing the UPS MIB

The MIB is in the MDU. Click **Download UPS-RFC1628-MIB** on the page of the web browser to download the MIB file which allows the third-party NMS to manage the UPS remotely.

Figure 4-65 Download the MIB



NOTE

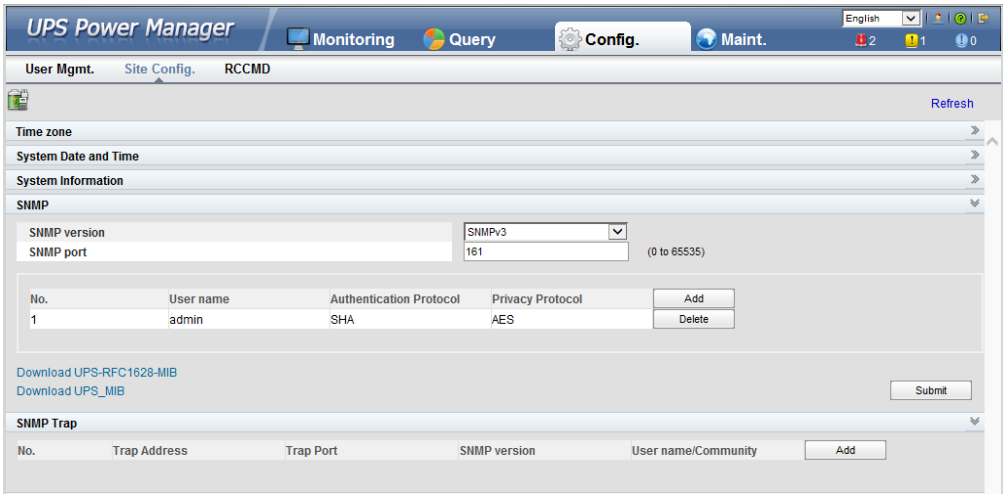
The UPS-RFC1628-MIB has more alarms than RFC1628. Download the UPS-RFC1628-MIB before using.

Managing the UPS by Using the NMS

- Applying for Access Rights

  To manage the UPS by using the UNMS II of Generex over the MDU, apply to the system administrator of the MDU for access rights and add the NMS information to the NMS access list of the MDU. The NMS address and access right settings are used for adding information about the NMS accessing the MDU, including the NMS address, access right, and Trap port. For details about how to add an NMS over a web browser, see Figure 4-66.

  Figure 4-66 Setting the SNMP Trap



- Managing the UPS

  Take the UNMS II of Generex for example. The method for managing the UPS by using the UNMS II is the same as the method for managing other devices by using the UNMS II. For details, see the UNMS II user manual.

4.2.5 Protecting the Server by Using the RCCMD Software

4.2.5.1 Introduction to the Software

The RCCMD shutdown software is part of the centralized monitoring system of the Generex network. The UPS5000 MDU integrates the functions of the Generex RCCMD server:

- Sends the shutdown command, notification message, and Trap message to the RCCMD client if the UPS system generates an alarm; executes commands on the RCCMD client.
- Receives the message "UPS alive check" sent by the RCCMD client and replies with the system status.
- Configures and saves the address and port for receiving the shutdown command, and the message sending mechanism.

For the method of installing the RCCMD client, see the manual related to the RCCMD.

4.2.5.2 RCCMD Event Shutdown and Message Sending

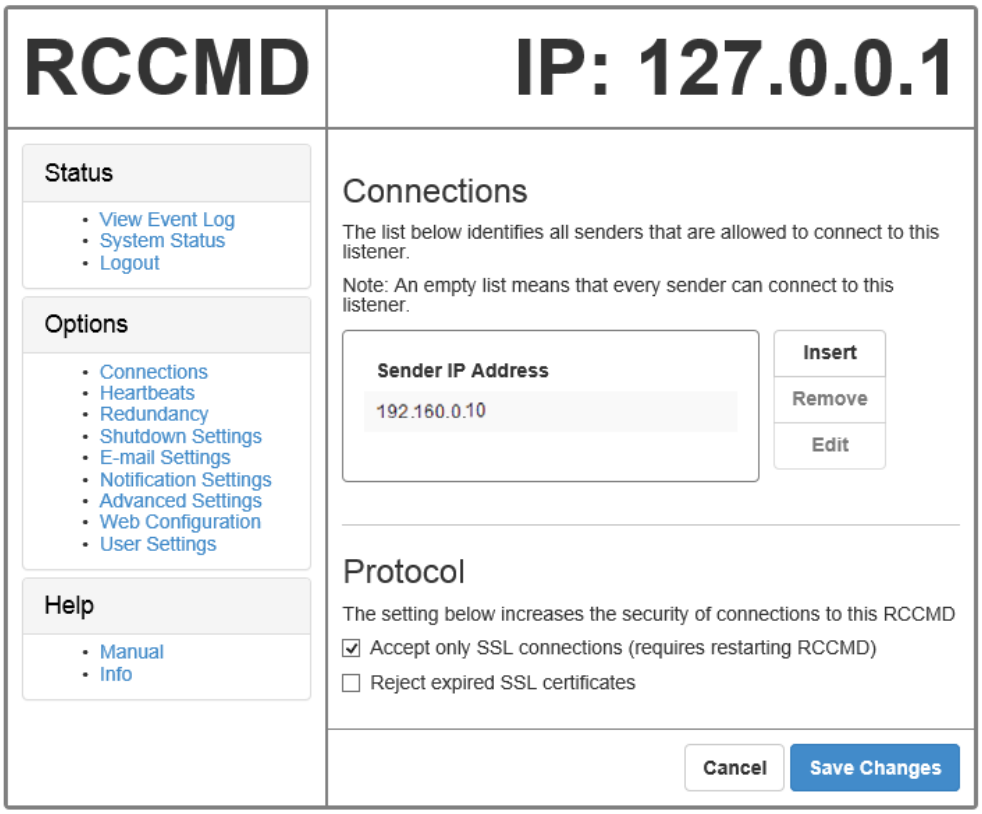
Procedure

Step 1 On the RCCMD client, choose **Connections**, add the server IP address, and set the encryption mode to encryption.

NOTE

- If encryption is disabled, you do not need to select the encrypted transmission.
- All configurations take effect only after restart.

Figure 4-67 Setting the MDU IP address and SSL encrypted transmission mode on the RCCMD client



Step 2 On the MDU WebUI, choose **Config.** > **RCCMD**, and set **RCCMD function** to **Enable**.

Step 3 On the WebUI of the MDU, the SSL encryption is set to **Enable** by default and does not need to be set. If the RCCMD client is set to the unencrypted mode, you need to set the SSL encryption to **Disable** on the server WebUI.

Step 4 Configure events. If you set the job type to **RCCMD Message** under **Inverter on**, specify the IP address and port of the RCCMD client. The port is 6003 by default. If you need to modify the port, modify the port on the RCCMD client at the same time to keep them the same. Enter the message to be sent and set the message sending mechanism. For example, set it to **Immediately, once**.

Step 5 On the **Monitoring** > **Control** page, start the UPS, and the inverter mode will be triggered. Send the message to the RCCMD client, indicating that the inverter is on.

Step 6 On the RCCMD client, you can view messages through the **View Event Log** at the upper left corner.

----End

4.2.5.3 UPS Alive Check Function

Context

NOTICE

Whether the RCCMD SSL encrypted transmission is enabled on the WebUI of UPS5000 MDU and RCCMD client is irrelevant to the heartbeat detection function. Only when the SSL encryption is enabled on the RCCMD client, the logs recorded by the RCCMD client are marked with "(SSL...)".

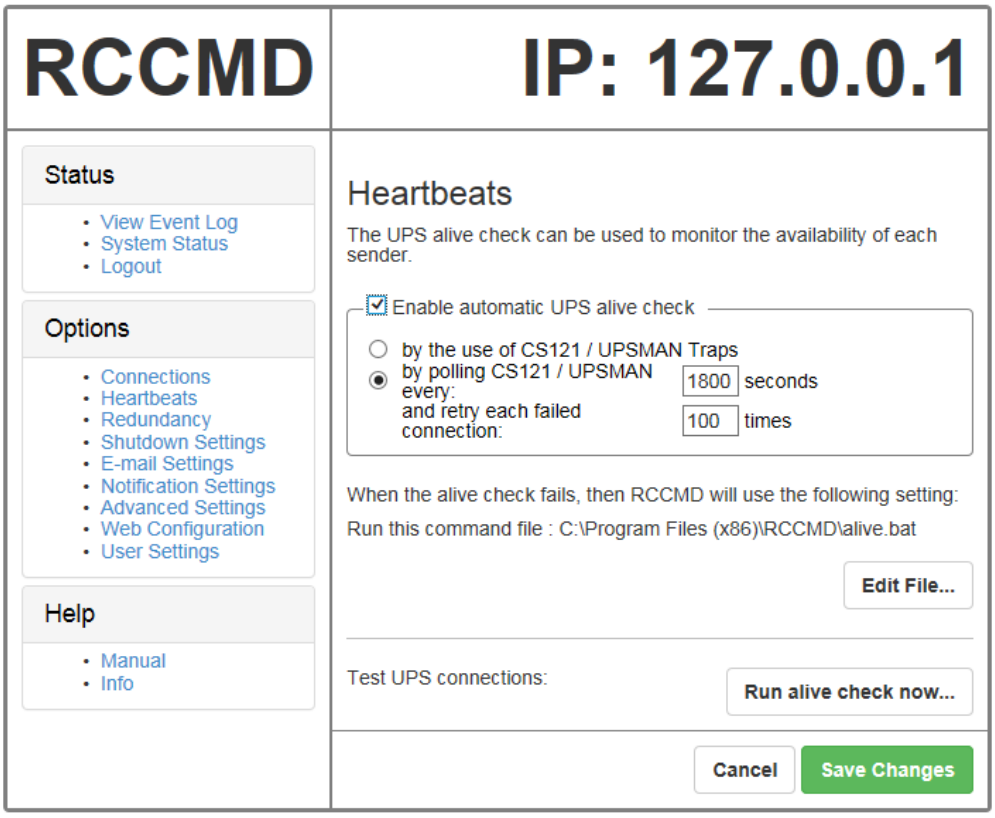
On the RCCMD client, the IP address of the MDU that detects heartbeat needs to be added. Then the UPS alive check function is supported; the RCCMD can check whether the UPS and RCCMD communicate properly; the RCCMD can receive messages sent by the MDU.

Procedure

Step 1 On the RCCMD client, add the IP address of the MDU that detects heartbeat, as shown in Figure 4-68.

Step 2 The UPS5000 MDU supports both ways of heartbeat detection. If the job configured for the MDU event is set to **RCCMD TRAP**, the RCCMD client needs to be set to **by the use of CS121/UPSMAN Traps**. If **by polling CS121/UPSMAN every x seconds...** is selected as the method of detecting heartbeats, set the detection method. The default interval is 1800s and detection is performed 100 times, as shown in Figure 4-68.

Figure 4-68 Heartbeat detecting mode on the RCCMD client



You can also manually detect heartbeat by clicking **Run alive check now...**.

Figure 4-69 Detecting heartbeat manually

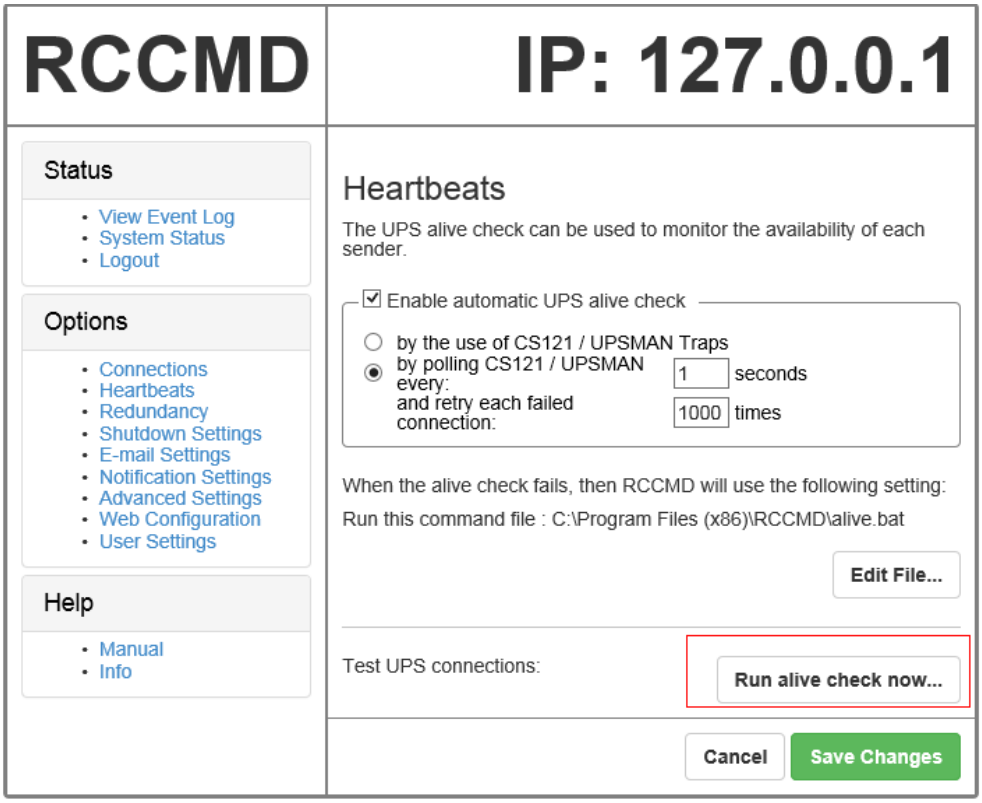


Figure 4-70 Detecting heartbeat manually and successfully

----End

5 Operations

5.1 Powering On and Starting the UPS

5.1.1 Powering On the UPS

Prerequisites

Measure the voltage and frequency of the UPS input switch and upstream input switch. The line voltage range is 138–485 V AC, and the frequency range is 40–70 Hz.

Context

- The following operations are applicable to a single UPS. For parallel systems, contact Huawei technical support.
- Before powering on the UPS, ensure that the UPS has passed all check items in the section "Installation Verification."
- Before powering on the UPS, ensure that all the UPS switches and upstream switch are OFF.

Procedure

Step 1 Close the upstream bypass and mains input switches.

Step 2 (Full configuration model) Close the UPS bypass input switch, mains input switch, and output switch.

After the UPS is powered on, initialization begins. The MDU displays the Huawei logo and an initialization progress bar.

----End

5.1.2 Starting the Inverter

Table 5-1 UPS system user list

Default User	Preset Password	
admin (administrator)	LCD	000001

Default User	Preset Password	
	WebUI	Changeme
operator (common user)	LCD	000001
	WebUI	Changeme
browser (browsing user)	WebUI	-

5.1.2.1 Initial Startup

Step 1 After the MDU starts properly, set the language, time, network parameters, system parameters, and battery parameters on the **Settings Wizard** screen.

NOTICE

Set system parameters with caution because the settings determine normal UPS operation.

- **Single/Parallel** and **Output frequency** must be correctly set. Otherwise, the UPS running may be affected.
- **Output voltage level** refers to the line voltage level.

Figure 5-1 Settings Wizard

NOTE

- Set the time and date correctly. Incorrect time and date will cause false fault analysis during maintenance or repair.
- After you set network parameters, connect the UPS to the network over a network cable, which enables you to remotely manage the UPS. If you do not need remote management, retain the default network parameter settings.

Step 2 (Optional) On the MDU, choose **System Info** > **Settings** > **DST Settings** and set the DST mode as required.

Step 3 After you set parameters on the **Settings Wizard** screen, the MDU displays the **Bypass mode** and **No battery** alarms, which do not need to be handled. If there is any other alarm, you need to rectify the fault.

NOTE

- After you set parameters on the **Settings Wizard** screen, choose **System Info** > **Settings** > **System Settings**. Check that **Requisite modules** and **Redundant modules** match the actual values.
- If dry contact signals are connected to the system, choose **System Info** > **Settings** > **Dry Contact Set** and check that the connected dry contacts have been enabled and that the disconnected dry contacts have been disabled.

Step 4 View the system running diagram on the MDU to check that the UPS is working in bypass mode.

----End

NOTICE

- The **Service Expert** app can be downloaded from Google Play and can run on Android. User interfaces displayed in this document correspond to the app version V100R001C00B055 and are for reference only.
- For offline startup, enter the barcode and the verification code on the mobile phone app. The app automatically generates a startup password for the UPS. Then enter the password on the MDU screen to start the UPS.
- For online startup, activate the startup password on the mobile phone app to start the UPS.
- If the initial startup verification passes, startup verification is not required afterwards.
- After factory settings are restored, re-verification for startup is required.

Online Startup

Step 1 Insert a WiFi module into the USB port on the MDU.

Step 2 Enable the mobile phone WLAN, search for the UPS WiFi signal, and connect to the WiFi signal. The default value of **SSID** is **UPS_WIFI**.

NOTE

The initial WiFi password is **Changeme** by default. You can change the password by choosing **System Info** > **Settings** > **Comm Settings** > **WiFi Settings** on the MDU.

Step 3 Open the **Service Expert** app on the mobile phone.

Step 4 On the home screen of the app, tap **Startup** to access the **Set Startup** screen.

Figure 5-2 Setting startup commissioning

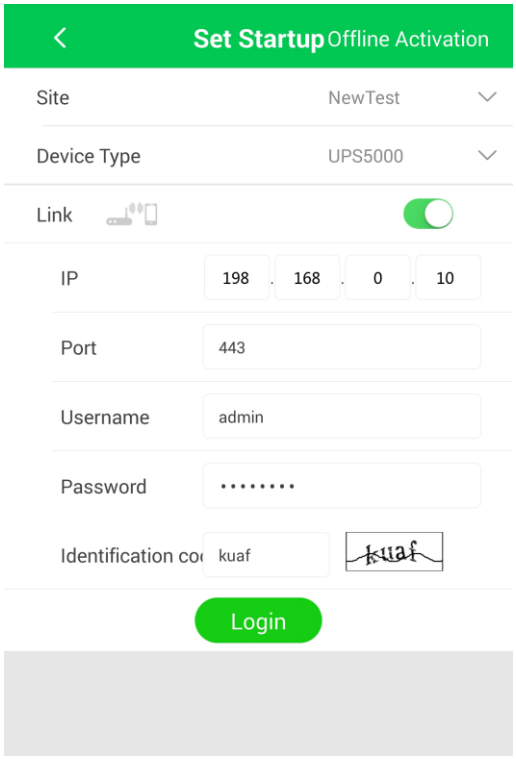
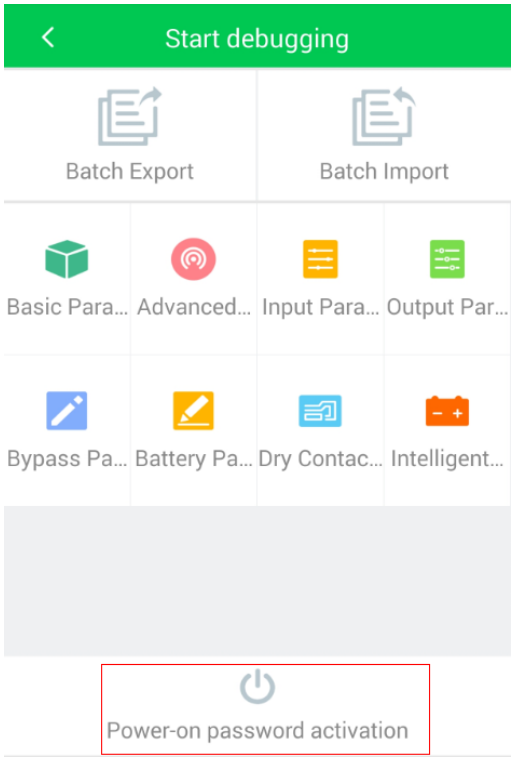


Table 5-2 Parameter description

Item	Setting Method
Site	Select the site as required.
Device Type	Select the device that needs to be connected. Select **UPS5000** in this situation.
Link	Enable the connection between the device and the WiFi network.
IP	UPS IP address, which can be obtained from the MDU.
Port	The port number is **443** by default and can be modified. If the UPS is managed using the app, the port number must be set to **443**.
Username, Password	Same as the user name and password of WebUI accounts.

Step 5 After login, tap **Power-on password activation** on the screen. A message is displayed, indicating whether to start the UPS. Tap **OK**.

Figure 5-3 Power-on password activation



----End

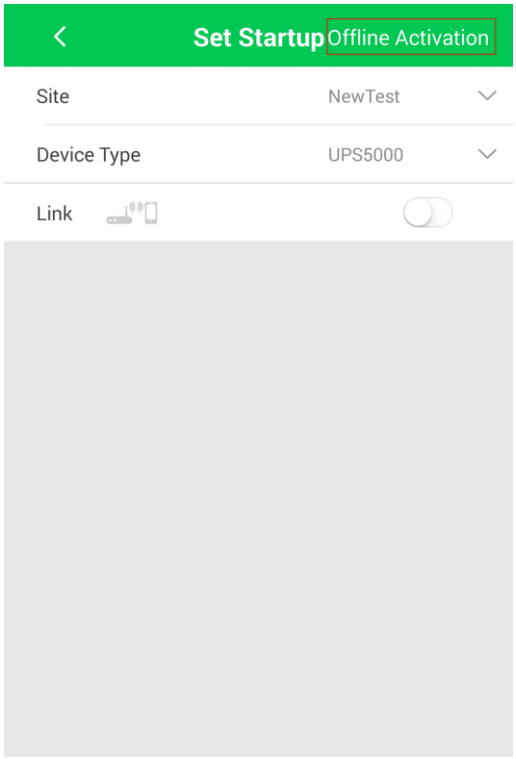
Offline Startup

Step 1 Open the **Service Expert** app on the mobile phone.

Step 2 On the home screen of the app, tap **Startup** to access the **Set Startup** screen.

Step 3 Set **Site** and **Device Type** as required, and tap **Offline Activation**.

Figure 5-4 Offline activation



Step 4 On the MDU, choose **System Info** > **Maintenance** > **Inv. ON**. You can obtain the **Bar code** and **Verification code** from the screen, as shown in the following figure.

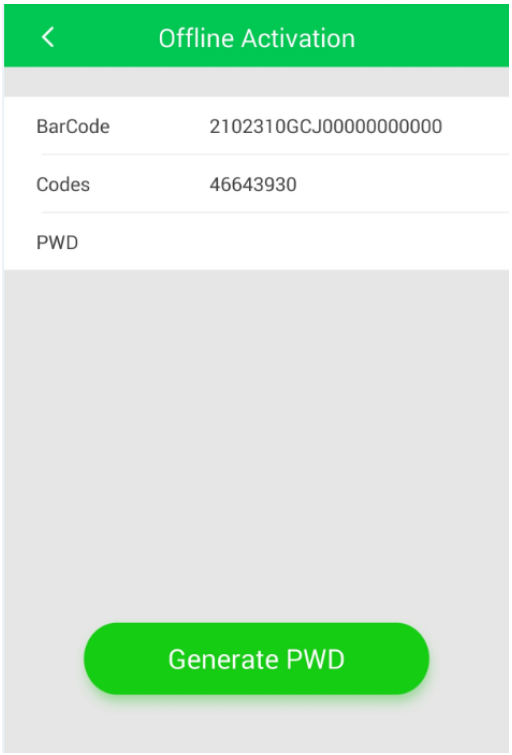
Figure 5-5 Offline startup

NOTE

The values of the **Bar code** and **Verification code** in the figure are for reference only. The actual values prevail.

Step 5 Enter **BarCode** and **Codes** obtained from the MDU on the **Offline Activation** screen. Tap **Generate PWD** to generate a startup password.

Figure 5-6 Generating a password



NOTICE

If the entered startup password is incorrect, you need to tap **Inv. ON** again on the MDU to obtain a new verification code, and then generate a password on the app.

Step 6 Enter the generated startup password in Figure 5-5 to start the UPS.

----End

5.1.2.2 Non-initial Startup

Starting the UPS on the MDU

Step 1 Choose **Common Functions** > **Inv. ON**.

NOTE

You can also start the inverter by choosing **System Info** > **Maintenance** > **Inv. ON**.

Step 2 In the displayed login screen, select a user name and enter the password.

Step 3 In the displayed dialog box, tap **Yes** to start the inverter.

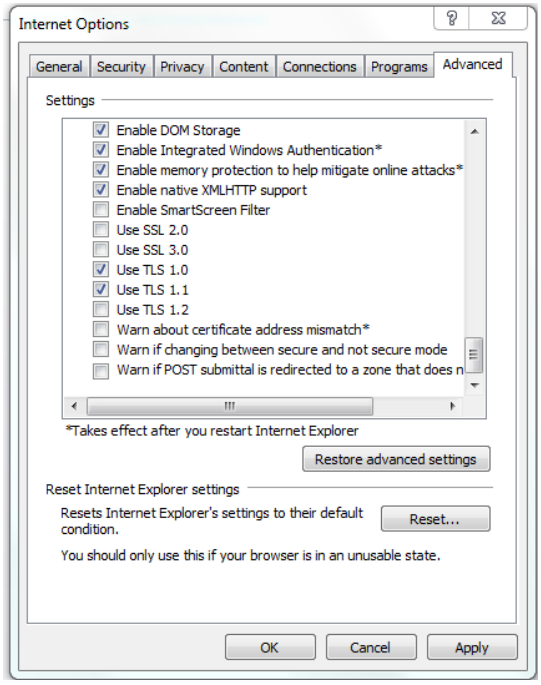
----End

Starting the UPS on the WebUI

Step 1 Open a browser (Internet Explorer 11 for example) and choose **Tools** > **Internet Options**.

Step 2 Click the **Advanced** tab, check that **Use TLS 1.0** and **Use TLS 1.1** are selected, and then click **OK**.

Figure 5-7 Setting the Internet options



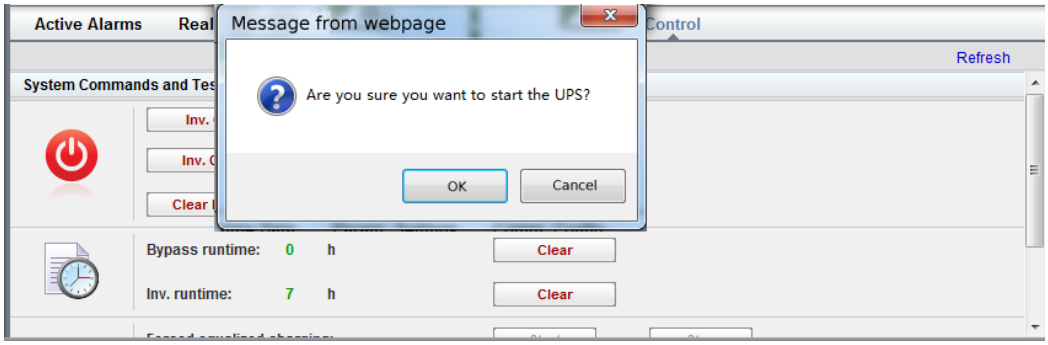
Step 3 In the address box of the browser, enter https://*UPS IP address*.

Step 4 Enter the correct user name and password and click **Login**.

Figure 5-8 Logging in to the WebUI

Step 5 On the home page of the WebUI, choose **Monitoring** > **Control**, click **Inv. ON**, and confirm the operation to start the inverter.

Figure 5-9 Starting the inverter



NOTE

If the power module receives a startup command when it cannot be started, the startup command will be kept for 1 minute. If the startup command is not cleared within 1 minute (for example, other faults occur on the module, or you perform shutdown or rectify faults) and the module can be started, the module responds to the startup command.

----End

5.1.3 Powering On Loads

Context

After the inverter starts, the UPS works in normal mode. The **Bypass mode** alarm disappears.

Procedure

Step 1 After confirming that the battery strings are properly connected, close the battery string input circuit breaker. If there are multiple battery strings, close the circuit breaker for each battery string and then the general circuit breaker between battery strings and the UPS. The **No battery** alarm disappears from the MDU.

Step 2 Close the UPS downstream output switch to supply power to the loads.

----End

5.1.4 (Optional) Setting Parameters for the BCB Box

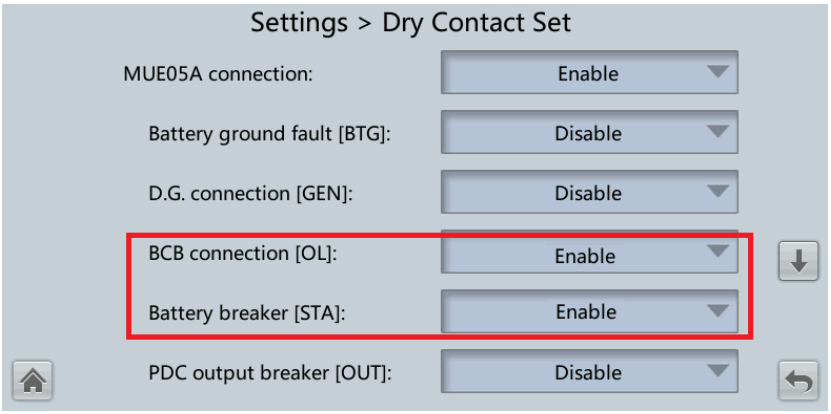
Prerequisites

A BCB box is installed.

Procedure

Step 1 On the **Settings** > **Dry Contact Set** screen, set **MUE05A connection** to **Enable**, and set **BCB connection [OL]** and **Battery breaker [STA]** to **Enable**.

Figure 5-10 BCB connection setting



----End

5.2 Shutting Down and Powering Off the UPS

Context

NOTICE

After the inverter is shut down, if the bypass is normal, the UPS transfers to bypass mode; if the bypass is not normal, the UPS supplies no power. Before shutting down the UPS, ensure that all loads have shut down.

Procedure

Step 1 Shut down the inverter.

- On the LCD

  On the main screen, tap **Common Functions**. Tap **Inv. OFF**.

  NOTE

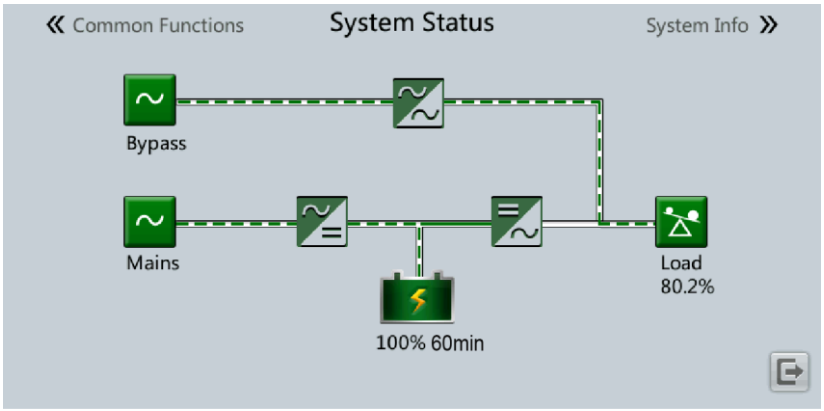
  To shut down the inverter on the **Maintenance** screen, tap **System Info** > **Maintenance**.

- On the WebUI

  Choose **Monitoring** > **Control**, and click **Inv. OFF**. In the displayed dialog box, click **OK** to shut down the inverter.

  After the inverter shuts down, the UPS works in bypass mode if the bypass is normal, as shown in Figure 5-11; the UPS supplies no power and the loads power off if the bypass is abnormal, as shown in Figure 5-11.

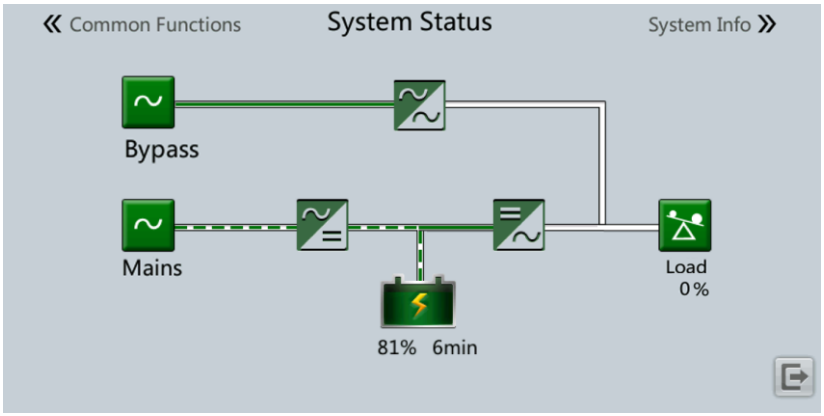
Figure 5-11 Normal bypass



NOTE

After you shut down the inverter, the **Bypass mode** alarm is displayed on the LCD.

Figure 5-12 Abnormal bypass



NOTE

If you need to shut down the inverter and transfer the UPS to bypass mode, check that the UPS has not generated an alarm and perform Step 1.

Step 2 After the inverter shuts down, open the downstreamoutput switch.

Step 3 Open the battery string circuit breaker. If there are multiple battery strings, open the general circuit breaker between battery strings and the UPS and then open the circuit breaker for each battery string.

Step 4 For a UPS in full configuration:

1. Open the UPS mains input switch, bypass input switch, and output switch.
2. Open the upstream mains input and bypass input switches.

Step 5 For a UPS in standard configuration, open the upstream mains input and bypass input switches.

----End

5.3 Starting the UPS in Battery Mode

Procedure

Step 1 Ensure that batteries have been connected properly. Use a multimeter to check that the voltage of a battery string is greater than a certain value (single battery voltage x number of batteries in the battery string).

Step 2 Open the upstream mains input and bypass input switches, and close the battery circuit breaker. If there are multiple battery strings, close the circuit breaker for each battery string and then the general circuit breaker between battery strings and the UPS.

Step 3 Use a multimeter to check that the voltage of battery strings at the UPS battery input terminal is greater than a certain value (single battery voltage x number of batteries in the battery string), which indicates that the batteries are connected properly.

Step 4 Press and hold down the **BATT START** button on the bypass module for at least 2 seconds. The system automatically enters the battery cold start status. The LCD displays the Huawei logo and an initialization progress bar.

Step 5 After LCD initialization, start the inverter.

----End

5.4 Transferring to Bypass Mode

NOTICE

Before shutting down the inverter, ensure that the bypass is normal. If the bypass is not normal, after the inverter is shut down, the UPS supplies no power, and the loads shut down.

Shut down the UPS inverter. Shut down the inverter on the LCD or WebUI, and the UPS transfers to bypass mode.

NOTE

If the inverter is shut down when the input voltage or frequency exceeds the specified threshold, the UPS supplies no power, and the loads shut down.

5.5 Setting ECO Mode

Prerequisites

The system is working in inverter mode.

Context

- The UPS is set to non-ECO mode by default. Set the UPS to ECO mode when energy saving is required.

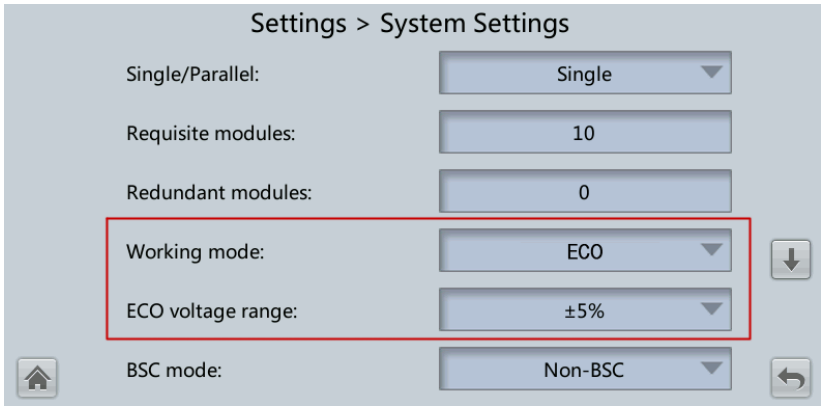
- In ECO mode, the bypass takes priority over the inverter in supplying power. If the bypass is disconnected, the UPS transfers to normal mode.
- Both a single UPS and the parallel system support the ECO mode for higher efficiency.
- To avoid frequent transfer between ECO mode and normal mode, do not set the ECO mode when the bypass input is unstable or is sensitive to load changes.
- ECO mode is not recommended when the load is less than 10%.
- Before transferring the UPS to ECO mode, ensure that the bypass module works properly.

Procedure

Step 1 On the LCD, choose **System Info** > **Settings** > **System Settings** and set **Working mode** to **ECO**. The information indicating that the UPS works in ECO mode is displayed on the LCD.

Step 2 Set the ECO voltage range.

Figure 5-13 ECO parameters

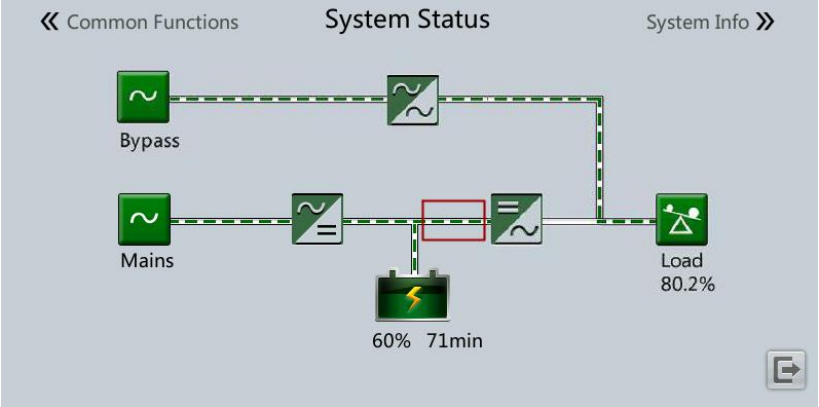


Step 3 (Optional) If you set ECO mode in bypass mode, manually start the UPS inverter.

NOTICE

After the inverter starts, the UPS still works in bypass mode and the inverter is on standby. If the bypass is not normal, the inverter supplies power immediately. If the inverter is not started, the UPS may be disconnected.

Figure 5-14 System status in ECO mode



----End

5.6 Testing Batteries

5.6.1 Forced Equalized Charging Test

Context

NOTICE

Before a forced equalized charging test, ensure that:

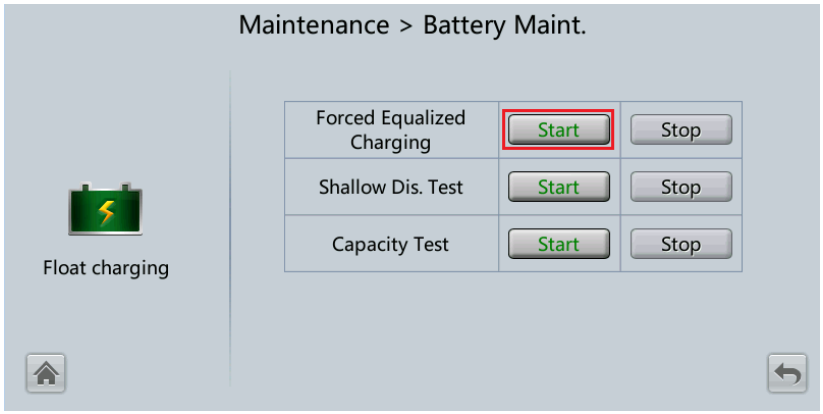
- The mains input is normal.
- Batteries are properly connected.
- Batteries are not in the equalized charging state.

Procedure

Step 1 On the home screen of the LCD, choose **System Info** > **Maintenance** > **Battery Maint**.

Step 2 Tap **Start** next to **Forced Equalized Charging** to start a forced equalized charging test.

Figure 5-15 Starting a forced equalized charging test



NOTE

The forced equalized charging test automatically stops in any of the following cases:

- The forced equalized charging test duration reaches the forced equalized charging protection time (12–24 h, 18 h by default).
- The UPS generates a battery overtemperature, overvoltage, or overcurrent alarm.
- An alarm is generated.

----End

5.6.2 Shallow Discharge Test

NOTICE

Before performing a shallow discharge test, ensure that:

- The UPS works in normal mode with a load ratio fluctuation less than 10%.
- The UPS generates no battery overtemperature, overvoltage, or overcurrent alarm. No generator is connected to the UPS.
- The mains, batteries, charger, and discharger are normal. No overload alarm is generated.

Automatic Shallow Discharge Test

Step 1 On the home screen of the LCD, choose **System Info** > **Settings** > **Battery Settings** and set **Sched. shallow dis. test** to **Enable**.

Step 2 Set **Sched. shallow dis. test time** and **Sched. shallow dis. test interval** as required. After setting is complete, the system will perform automatic shallow discharge tests based on the settings.

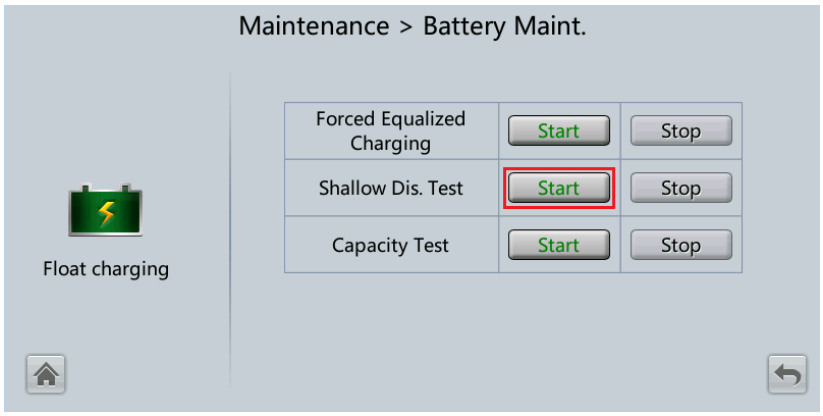
----End

Manual Shallow Discharge Test

Step 1 On the home screen of the LCD, choose **System Info** > **Maintenance** > **Battery Maint**.

Step 2 Tap **Start** next to **Shallow Dis. Test** to start a shallow discharge test.

Figure 5-16 Starting a shallow discharge test



NOTE

When the battery test is complete, the test data is used as common test data. Record the data obtained from the latest five tests.

The shallow discharge test automatically stops in any of the following cases:

- The battery discharge capacity reaches the specified value (10%–50%, 20% by default).
- The discharge voltage reaches the warning threshold (calculated in real time).
- The load ratio fluctuation exceeds 10%.
- An alarm is generated.

----End

5.6.3 Capacity Test

Context

NOTICE

Before a capacity test, ensure that:

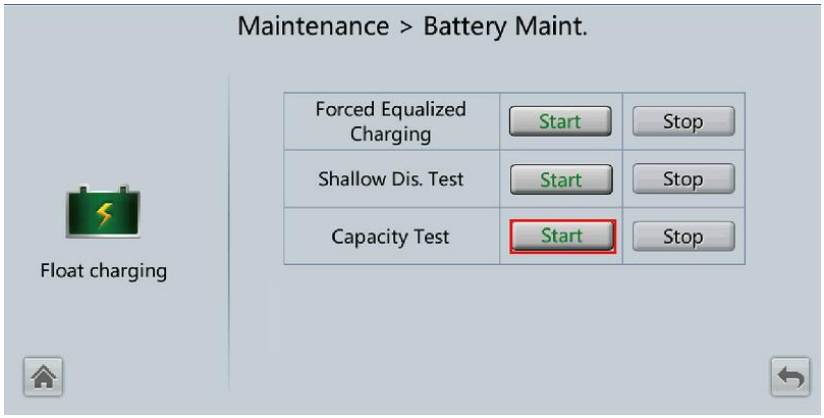
- The UPS is working in normal mode; float charging or hibernation has lasted for 2 hours after the state of charge (SOC) reaches 100%; and the load ratio fluctuation is less than 10%.
- The UPS has generated no battery overtemperature, overvoltage, or overcurrent alarm. No generator is connected to the UPS.
- The mains, batteries, charger, and discharger are normal. No overload alarm is generated.

Procedure

Step 1 On the home screen of the LCD, choose **System Info** > **Maintenance** > **Battery Maint**.

Step 2 Tap **Start** next to **Capacity Test** to start a capacity test.

Figure 5-17 Starting a capacity test



NOTE

The capacity test automatically stops in any of the following cases:

- The battery discharge voltage reaches the end of discharge (EOD) voltage plus 0.01 V.
- The load fluctuation exceeds 10%.
- An alarm is generated.

When the battery discharge voltage reaches the EOD voltage plus 0.01 V, the test is complete. The test data is used as capacity test data. Save the capacity test data record with the largest discharge capacity in a month as the capacity test data for the month. A maximum of recent 36 capacity test records can be saved.

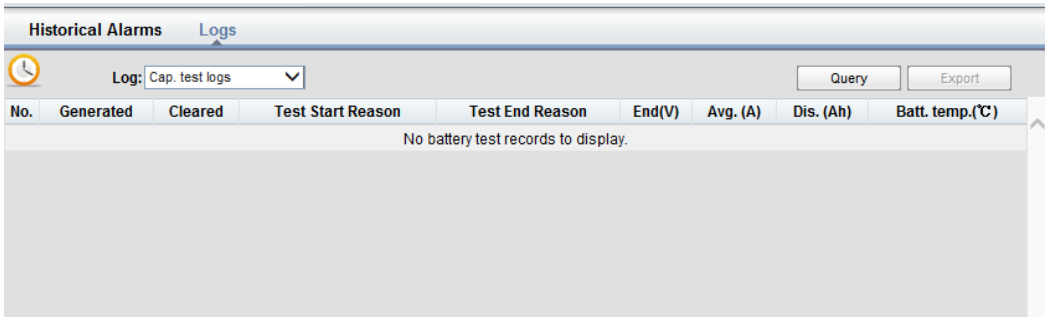
----End

5.6.4 Test Data Download

Procedure

Step 1 On the WebUI, choose **Query** > **Logs**, choose logs that need to be exported from the **Log** drop-down list box, and click **Query**.

Figure 5-18 Logs



Step 2 Choose logs that have been queried from the **Log** drop-down list box, and click **Export**.

----End

5.7 Transferring to Maintenance Bypass Mode

Context

NOTICE

- You are advised to install a lock on the maintenance bypass switch. The lock core has a diameter of 5–10 mm.
- Strictly observe the following procedure to transfer the UPS to maintenance bypass mode. Otherwise, loads may power off.
- In maintenance bypass mode, the mains supplies power to the loads directly over the maintenance bypass. If the mains is abnormal, the loads may power off.

Procedure

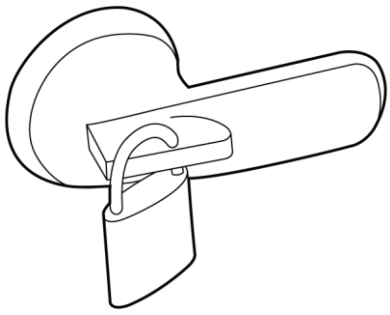
Step 1 Manually switch the UPS to bypass mode.

Step 2 Close the maintenance bypass switch.

If the maintenance bypass switch is locked, unlock it first. Figure 5-19 and Figure 5-20 shows a locked maintenance bypass switch. After you close the maintenance bypass switch, the UPS transfers to maintenance bypass mode. The maintenance bypass switch is OFF by default. To close the maintenance bypass switch, rotate it to the ON position, as shown in Figure 5-21 and Figure 5-22.

The **Maint. breaker closed** alarm is displayed in the alarm list, as shown in Figure 5-23. The UPS transfers to maintenance bypass mode.

Figure 5-19 Locked maintenance bypass switch (400 kVA UPS and 500 kVA UPS)



UA10000066

Figure 5-20 Locked maintenance bypass switch (600 kVA UPS)

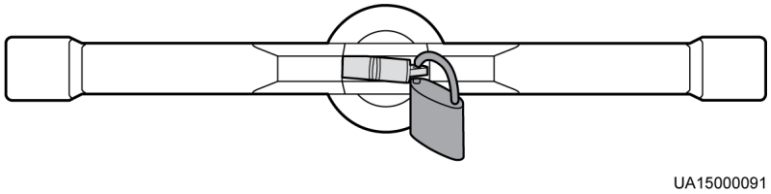


Figure 5-21 Closing the maintenance bypass switch (400 kVA UPS in full configuration)

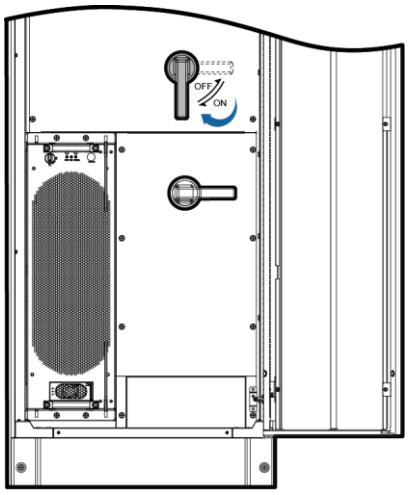
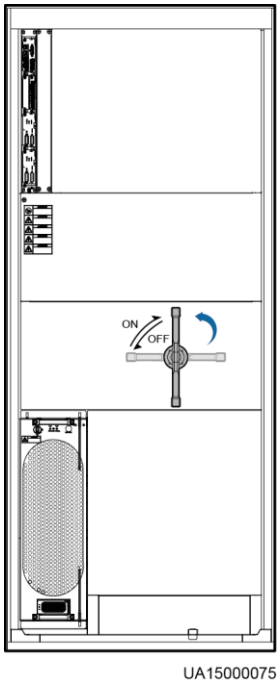


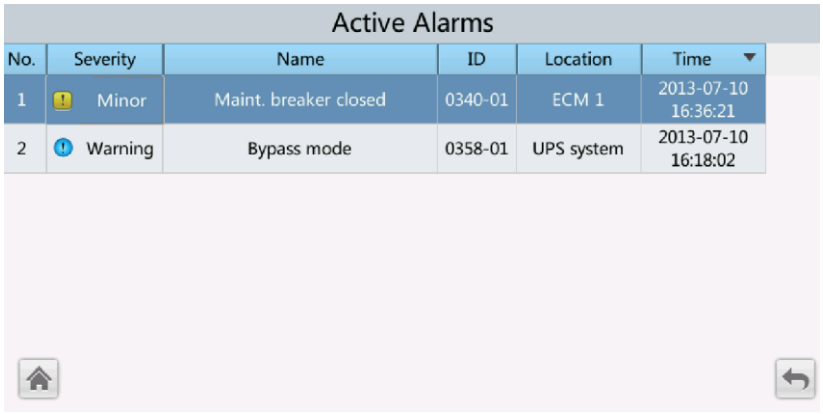
Figure 5-22 Closing the maintenance bypass switch (600 kVA UPS in standard configuration)



NOTE

- Figure 5-21 shows how to operate the maintenance bypass switch on a 400 kVA UPS in full configuration. Operate the maintenance bypass switches on a 400 kVA UPS in standard configuration and a 500 kVA UPS in this way. Figure 5-22 shows how to operate the maintenance bypass switch on a 600 kVA UPS in standard configuration. Operate the maintenance bypass switches on a 600 kVA UPS in full configuration and an 880 kVA UPS in this way.
- Exercise force when closing or opening the bypass maintenance switch.

Figure 5-23 Maint. breaker closed alarm



NOTE

After the UPS transfers to maintenance bypass mode, the **Maint. breaker closed** and **Bypass mode** alarms are displayed on the LCD.

----End

5.8 Transferring from Maintenance Bypass Mode to Normal Mode

Context

NOTICE

Before you transfer the UPS from maintenance bypass mode to normal mode, ensure that the bypass input and output are normal.

Procedure

Step 1 Open the maintenance bypass switch.

Turn the maintenance bypass switch from the ON position to the OFF position, as shown in Figure 5-24 and Figure 5-25.

The **Maint. breaker closed** alarm disappears from the alarm list. Check whether the UPS works in bypass mode by viewing the system running status diagram on the LCD or WebUI.

Figure 5-24 Opening the maintenance bypass switch (400 kVA UPS in full configuration)

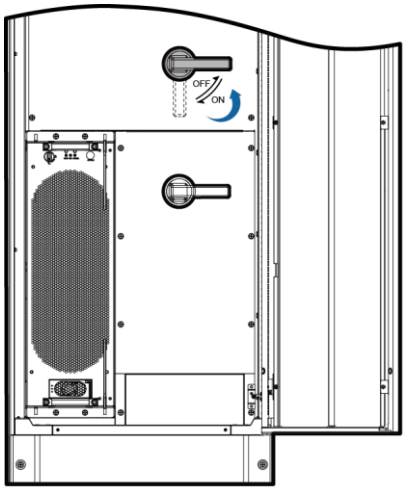
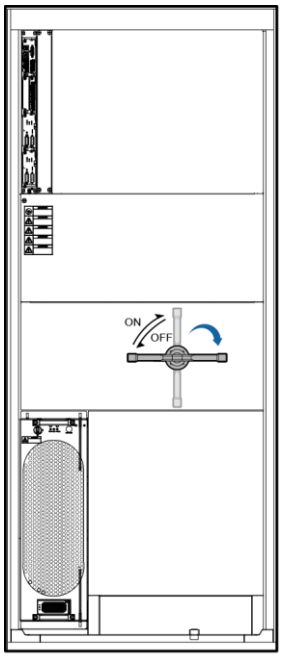


Figure 5-25 Opening the maintenance bypass switch (600 kVA UPS in standard configuration)



NOTE

Figure 5-24 shows how to operate the maintenance bypass switch on a 400 kVA UPS in full configuration. Operate the maintenance bypass switches on a 400 kVA UPS in standard configuration and a 500 kVA UPS in this way. Figure 5-25 shows how to operate the maintenance bypass switch on a 600 kVA UPS in standard configuration. Operate the maintenance bypass switches on a 600 kVA UPS in full configuration and an 880 kVA UPS in this way.

Step 2 Start the inverter.

----End

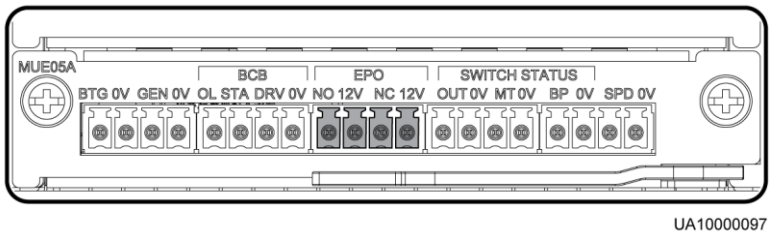
5.9 Performing EPO

NOTICE

- After the EPO button is turned on, the UPS supplies no power and the loads shut down.
- In maintenance bypass mode, the UPS continues to supply power even after the EPO button is turned on.

Press the external EPO switch that connects to the dry contact card or remove the 4-pin terminal on the EPO port of the dry contact card of the bypass unit.

Figure 5-26 EPO ports



After you press the EPO button, the **EPO** and **No power supplied** alarms are displayed on the LCD.

5.10 Clearing the EPO State

Procedure

Step 1 Clear the EPO state. Ensure that the EPO button connected to the dry contact is not in the EPO state.

Step 2 Clear the EPO alarm.

- On the LCD

  On the LCD, choose **System Info** > **Alarms** and tap **Clear Faults**. In the displayed dialog box, tap **Yes**. The EPO alarm is cleared successfully.
- On the WebUI

  Choose **Monitoring** > **Control** > **System Commands and Tests** and click **Clear Fault**. The EPO alarm is cleared successfully.

Step 3 Check that the EPO alarm is cleared by viewing active alarms. If the system bypass input is normal, the UPS transfers to bypass mode.

- Viewing active alarms on the LCD

  Choose **System Info** > **Alarms** and tap **Active Alarms** to check that the EPO alarm is cleared.
- Viewing active alarms on the WebUI

Choose **Monitoring** > **Active Alarms** to check that the EPO alarm is cleared.

Step 4 Start the inverter.

----End

5.11 Exporting Data

Prerequisites

You have logged in to the WebUI.

Context

The following data can be exported:

- Historical alarms
- Logs
- E-Label
- iBOX version
- Fault Data

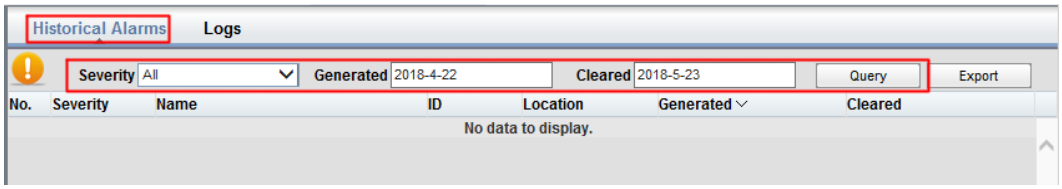
NOTE

This topic describes how to export historical alarms.

Procedure

Step 1 Choose **Query** > **Historical Alarms**, and set **Severity**, **Generated**, and **Cleared**.

Figure 5-27 Querying historical alarms



NOTE

You do not need to query logs. Choose **Query** > **Logs**, click **Export**, and save the file.

Step 2 Click **Query**, and you can see the corresponding historical alarms.

Step 3 Click **Export** and save the displayed webpage.

----End

5.12 Setting Hibernation Mode

Prerequisites

NOTICE

- Ensure that the load power is stable. If the system load power fluctuation is greater than the rated capacity of half a module (for example, the single-phase load power fluctuation is greater than 8.33 kVA for a 50 kVA module), the UPS may enter and exit from hibernation mode repeatedly.
- Check that the number of redundant power modules and racks are appropriate. If the number is insufficient, the UPS may not enter hibernation mode.

Context

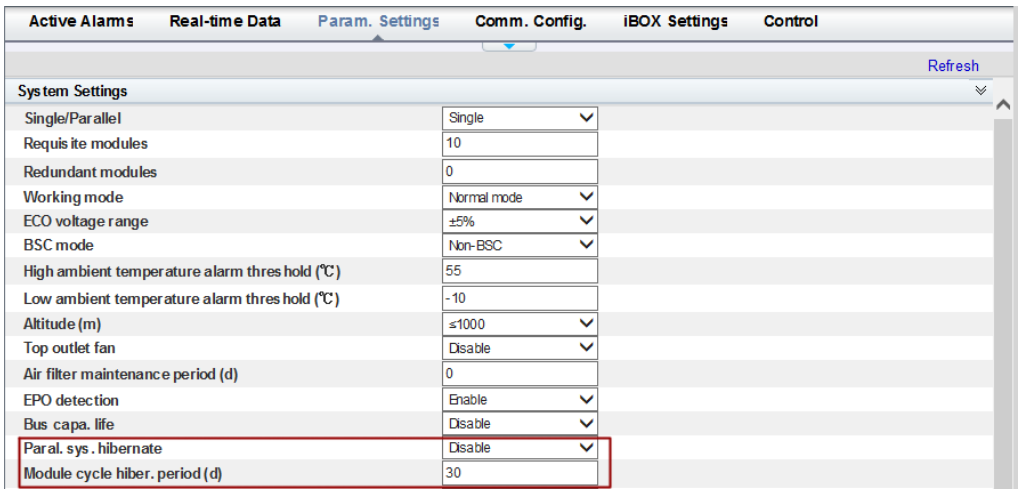
When the load power is small and stable, you can shut down the inverters in some power modules so that these power modules enter hibernation mode and other power modules bear all the load power. This improves the system efficiency in the case of small load power and increases the power module service life. The hibernation function can be set on the WebUI.

Procedure

Step 1 On the WebUI, choose **Monitoring** > **Param. Settings** > **System Settings** and set **Paral. sys. hibernate** to **Enable**.

Step 2 Set the module cycle hibernation period to an integer ranging from 1 to 100. The default value is 30.

Figure 5-28 System settings



NOTE

Click **Submit** after setting parameters on the WebUI.

----End

6 Routine Maintenance

6.1 UPS Maintenance

NOTICE

- Only trained personnel are allowed to perform maintenance. Before performing operations on the UPS, wear electrostatic discharge (ESD) clothes, ESD gloves, and an ESD wrist strap. Remove conductive objects such as jewelry or watches during operations to avoid electric shocks or burns.
- Use insulated tools when maintaining internal devices. Only trained personnel are allowed to perform maintenance. Customers are not allowed to maintain components behind protective covers that can be removed only using tools. If the components are to be maintained, contact Huawei technical support.
- Only maintenance engineers can maintain power modules and bypass modules.
- Maintain UPSs regularly based on the following requirements. Otherwise, the UPSs may fail to operate properly and the service life may be shortened.

6.1.1 Monthly Maintenance

Table 6-1 Monthly maintenance

Check Item	Expected Result	Troubleshooting
Operating environment	• Ambient temperature: 0–40°C • Humidity: 0–95% RH (non-condensing) • Rodent-proof measures have been taken for the equipment room. • The equipment room is airtight.	• If the humidity or temperature is abnormal, check the air conditioner status. • Put rodent-proof baffle plates at the door of the UPS equipment room. • Check that the equipment room is airtight and not in a direct ventilation environment.
Power grid environment	• Input voltage: 380 V AC, 400 V AC, or 415 V AC (line voltage)	• If the input voltage is abnormal, check the power grid status and input cable

Check Item	Expected Result	Troubleshooting
	• Output voltage: 380 V AC, 400 V AC, or 415 V AC (tolerance ± 1%, line voltage) • Frequency: 40–70 Hz	connection. • If the output voltage is abnormal, check the UPS running status and check whether an alarm is generated.
Information on the LCD	The status icons on the LCD indicate that all units are operating properly, all operating parameters are within their normal ranges, and no fault or alarm information is displayed.	If an alarm is generated, rectify the fault by checking the device status and parameters.

6.1.2 Quarterly Maintenance

Table 6-2 Quarterly maintenance

Check Item	Expected Result	Troubleshooting
Cleanliness	Wipe the cabinet surface using a white paper and the paper does not turn black.	Remove the dust, especially from the air filter on the front door, or replace the air filter.
Parameter configuration	The configuration of the output voltage grade, frequency, number of batteries, and battery capacity meets requirements.	Reset the parameters.
Status record	Record the three-phase load rate and output power factor.	If an exception occurs, check the load status.
Shallow discharge test (recommended)	Conduct a shallow discharge test when the UPS is backed up to verify that the batteries can discharge normally.	If an alarm is generated, refer to the alarm list.

6.1.3 Annual Maintenance

Table 6-3 Annual maintenance

Check Item	Expected Result	Troubleshooting
Grounding	Check that the ground cables are connected securely.	Tighten the screws.
Power cables and terminals (between the UPS and the power distribution cabinet)	The insulation layer of cables is intact and terminals are free from black marks	• Replace the cables. • Secure the output terminals.

Check Item	Expected Result	Troubleshooting
	and noticeable sparks.	
Cables and circuit breaker through-current capacity	The circuit breakers and cables meet load requirements. The actual cable through-current capacity is greater than the circuit breaker specifications.	• Replace the circuit breaker. • Replace the cable.

To prevent system failures caused by the deterioration of some key UPS components, you are advised to check the key components on a regular basis and replace them within the service life.

Table 6-4 Service life parameters for replaceable components and recommended replacement intervals

Key Component	Design Service Life	Recommended Replacement Interval
Power module	15 years	10 years
Bypass module	15 years	10 years
Fan	15 years	10 years
LCD screen	10 years	8 years

6.2 Battery Maintenance

NOTICE

Before installing batteries, read through the battery user manuals and pay attention to safety precautions and connection methods provided by battery manufacture.

When installing and maintaining batteries, pay attention to the following points:

- Wrap tools with insulation tape to prevent electric shock.
- Protect your eyes with relevant devices and apply other protective measures.
- Wear insulated gloves and a protective coat in case of electrolyte overflow.
- When moving batteries, avoid handling the battery upside down, handle batteries gently, and pay attention to personal safety.
- Keep the battery switch off when installing or maintaining the batteries.

6.2.1 Precautions for Battery Maintenance

- Before battery maintenance, get the tools, such as handles, insulated. Do not place other objects on the top of batteries.
- Never use any organic solvent to clean batteries.
- Never try to remove the safety valve or pour anything into batteries.
- Never smoke or have an open flame around batteries.
- After battery discharge, charge the battery in time to maintain a good service life.
- Only professionals are allowed to perform the maintenance tasks.

6.2.2 Monthly Maintenance

Table 6-5 Monthly maintenance

Item	Expected Result	Troubleshooting
Battery management alarm	No battery management alarm is generated.	Identify the cause of an alarm based on the alarm information.
Battery appearance	1. The surface is clean and tidy without stains. 2. The battery terminals are intact. 3. Batteries are free from damage and cracks. 4. Batteries are free from acid leakage. 5. Batteries are not deformed or bulged.	If the battery appearance is abnormal, contact Huawei technical support.
Battery operating temperature	1. The ambient battery temperature is 25±5°C. 2. The battery operating temperature is lower than battery temperature +20°C. 3. Battery charge and discharge conditions meet the requirements specified in the battery specifications.	1. Identify the cause of an abnormal battery operating temperature. 2. If the fault persists, contact Huawei technical support.
Charge voltage of battery string	• Equalized charging voltage: (2.35 V/cell ± 1%) x number of battery cells	1. If the voltage drop between the battery string output terminals and the battery input terminals at the UPS side is greater than

Item	Expected Result	Troubleshooting
	• Float charging voltage: (2.25 V/cell ± 1%) x number of battery cells	1% of the battery string voltage, check whether the cable between the battery string and the UPS is excessively long, or the cable diameter is excessively small. 2. Check whether the equalized charging voltage and float charging voltage are correctly set for the UPS. 3. If the fault persists, contact Huawei technical support.

6.2.3 Quarterly Maintenance

Table 6-6 Quarterly maintenance

Item	Expected Result	Troubleshooting
Battery temperature sensor measurement accuracy	The difference between the temperature measured by the temperature sensor and the temperature displayed on the MDU is less than 3°C.	1. Install the temperature sensor in the correct position. 2. Replace the battery temperature sensor.
Battery management parameter settings	The settings of battery management parameters meet the requirements in the user manual.	Set parameters correctly.
Tightness of battery screws	The location of the signs marked on battery terminals indicating tight connections does not change.	Take photos from multiple angles and contact Huawei technical support.
Cables between batteries	No cable deteriorates and the insulation layer does not crack.	Replace the faulty cable.
Battery voltage	• Equalized charging voltage: 2.35 V/cell ± 0.02 V/cell • Float charging voltage: 2.25 V/cell ± 0.02 V/cell	1. Check whether the equalized charging voltage and float charging voltage of a battery are normal. 2. If the charging voltage of a battery exceeds the specifications requirement, perform a complete forcible equalized charging for the battery, and check again whether the voltage is normal.

Item	Expected Result	Troubleshooting
		3. If the fault persists, contact Huawei technical support.
Shallow discharge test (recommended)	Conduct a shallow discharge test when the UPS is backed up to verify that the batteries can discharge normally.	1. If the batteries cannot discharge normally, locate the fault (for abnormal alarms, see the alarm list). 2. If the fault persists, contact Huawei technical support.

6.2.4 Annual Maintenance

Table 6-7 Annual maintenance

Item	Expected Result	Troubleshooting
Capacity Test	When the UPS is backed up, discharge a battery to the undervoltage alarm threshold, to refresh the capacity of the battery.	1. Locate the cause when an exception is identified. 2. If the fault persists, contact Huawei technical support.
Battery connection reliability	1. Each battery terminal is connected reliably. (When battery strings are powered off, check the reliability of each terminal in the order from positive terminals to negative terminals.) 2. The tightening torque of each battery screw meets the requirements of the battery manufacturer. (A torque wrench is used for checking the torque. After checking that the battery screws meet the requirements, mark the screws for later check.)	1. Rectify any abnormal connection. 2. If the fault persists, contact Huawei technical support.

7 Troubleshooting

CAUTION

- If the UPS is faulty, alarm information is displayed on the LCD. Clear critical alarms before powering on the UPS again. Otherwise, the fault scope expands or the UPS is damaged.
- Do not clear alarms by reseating modules.
- Remove a faulty module after it is confirmed that the module needs replacing. After removing the module, do not insert it into the UPS again.

NOTICE

- After a UPS finishes troubleshooting and is started, if the LCD continues displaying alarm information, choose **System Info** > **Alarms** > **Clear Faults** to clear the alarm and then start the inverter.
- When batteries reach EOD, the battery switch in the BCB box trips if the BCB box is configured. To restore battery discharge, close the battery switch in the BCB box (if any) first.
- To restore battery discharge after batteries reach EOD, use one of the following methods: 1. Switch to another battery string. Ensure that each battery has a voltage greater than the EOD voltage and 11.3 V/cell. 2. Restore the mains power supply to start the inverter. Close the battery switch and charge batteries until each battery has a voltage greater than the EOD voltage and 11.3 V/cell.

For details about how to rectify common faults, see Table 7-1. If any unmentioned faults occur, see the alarm list chapter, or contact Huawei technical support.

Table 7-1 Troubleshooting

Case	Symptom	Possible Cause	Measure
The rectifier is not	The rectifier is not working, and the bus voltage is not boosted.	The mains voltage exceeds the upper threshold 280 V or is less than the lower	Check whether the mains voltage exceeds the threshold. If yes, contact the electric

Case	Symptom	Possible Cause	Measure
normal.		threshold 80 V.	power company.
		PFC soft-startup fails.	Replace the power module.
		The power module is faulty.	Replace the power module.
The inverter is not normal.	The buzzer is activated, the Fault indicator is on, the inverter is faulty, and the UPS transfers to bypass mode.	The UPS is overloaded or short-circuited.	Reduce load or rectify short circuits.
		Inverter overtemperature occurs.	Install more air conditioners or ventilation devices to ensure normal temperatures inside the equipment room.
		The power module is faulty.	Replace the power module.
The charger generates an alarm.	The buzzer is activated, the Fault indicator is on, and the charging function fails.	The charger fails.	Replace the power module.
		The charger experiences overcurrent.	Replace the power module.
		The charger experiences undervoltage.	Check whether the configured number of batteries is correct. If the value is correct but the alarm persists, replace the power module.
The UPS works in bypass mode and does not transfer to inverter mode.	When the mains is normal, the UPS works in bypass mode and does not transfer to inverter mode.	Set the UPS working mode to ECO mode.	Set the working mode correctly.
		The bypass transfer times reach the upper threshold.	Clear the bypass transfer times on the LCD.
The bypass is not normal.	The buzzer is activated, and the Fault indicator is on.	The bypass thyristor is damaged.	Replace the bypass module.
		The bypass module experiences overtemperature.	Reduce the load, or improve ventilation.

NOTE

For details about component replacement and maintenance involved in Troubleshooting and Alarm List, consult Huawei maintenance engineers.

8 Technical Specifications

8.1 Physical Parameters

Physical Parameters	400 kVA	500 kVA	600 kVA	880 kVA
Cabling mode	Cables are routed from the top or bottom.			
Protection level	IP20 (IP21 can be reached by configuring IP21 components.)			
Dimensions (H x W x D)	2000 mm x 1200 mm x 850 mm		2000 mm x 1400 mm x 850 mm	2000 mm x 2400 mm x 850 mm
Communication	Supports dry contacts, RS485 ports, and FE ports. Supports Simple Network Management Protocol (SNMP).			
Weight	UPS5000-S-400K-SM: 670 kg UPS5000-S-400K-FM: 710 kg	UPS5000-S-500K-SM: 790 kg UPS5000-S-500K-FM: 830 kg	UPS5000-S-600K-SM: 1060 kg UPS5000-S-600K-FM: 1110 kg	UPS5000-S-880K-SM: 1550 kg UPS5000-S-880K-FM: 1600 kg

8.2 Internal Switch Parameters

UPS	Maintenance bypass switch	Mains input switch	Bypass input switch	Output switch
UPS5000-S-400K-SM	1000 V AC/630 A/3P	-	-	-
UPS5000-S-400K-FM	1000 V AC/630 A/3P	1000 V AC/800 A/3P	1000 V AC/630 A/3P	1000 V AC/630 A/3P
UPS5000-S-500K-SM	1000 V AC/800 A/3P	-	-	-

UPS	Maintenance bypass switch	Mains input switch	Bypass input switch	Output switch
UPS5000-S-500K-FM	1000 V AC/800 A/3P	1000 V AC/1000 A/3P	1000 V AC/800 A/3P	1000 V AC/800 A/3P
UPS5000-S-600K-SM	1000 V AC/1000 A/3P	-	-	-
UPS5000-S-600K-FM	1000 V AC/1000 A/3P	1000 V AC/1250 A/3P	1000 V AC/1000 A/3P	1000 V AC/1000 A/3P
UPS5000-S-880K-SM	1000 V AC/1250 A/3P	-	-	-
UPS5000-S-880K-FM	1000 V AC/1250 A/3P	1000 V AC/1600 A/3P	1000 V AC/1250 A/3P	1000 V AC/1250 A/3P

8.3 Environment Parameters

Environment Feature	400 kVA	500 kVA	600 kVA	880 kVA
Operating temperature	0–40°C			
Storage temperature	–40°C to +70°C			
Relative humidity	0%–95% RH (non-condensing)			
Altitude	0–1000 m When the altitude is greater than 1000 m and less than 4000 m, the rated power should be derated. For details, see the IEC62040-3.			

8.4 Safety Regulations and EMC

Safety and EMC	400 kVA	500 kVA	600 kVA	880 kVA
Safety regulations	EN62040-1: 2013 IEC62040-1: 2013 YD/T2165-2010			
EMC	EN62040-2 IEC62040-2			

Safety and EMC	400 kVA	500 kVA	600 kVA	880 kVA
	IEC61000-2-2 IEC61000-4-2 IEC61000-4-3 IEC61000-4-4 IEC61000-4-5 EN61000-4-3 EN61000-4-6 IEC61000-4-8 IEC61000-4-11			

8.5 Mains Input Electrical Specifications

Item	400 kVA	500 kVA	600 kVA	880 kVA
Input system	Three-phase, four-wire, and PE; The mains input with no neutral wire is supported, and current flows back through the ground cable.			
Rated input voltage	380 V AC, 400 V AC, or 415 V AC (line voltage)			
Input voltage	80–280 V AC (phase voltage) At 40°C: The UPS works at full load when the voltage is 176–280 V AC. The load bearing capacity is derated to 40% when the voltage is 176–80 V AC.			
Rated frequency	50 Hz or 60 Hz			
Input frequency	40–70 Hz			
Input PF	• > 0.99 (full load) • > 0.98 (half load)			
THDi	• THDi ≤ 3% (full linear load) • THDi ≤ 5% (full non-linear load)			

8.6 Bypass Input Electrical Specifications

Item	400 kVA	500 kVA	600 kVA	880 kVA
Input	Three-phase, four-wire, and PE			

Item	400 kVA	500 kVA	600 kVA	880 kVA
system				
Rated input voltage	380 V AC, 400 V AC, or 415 V AC (line voltage)			
Rated frequency	50 Hz or 60 Hz			
Input frequency	±6 Hz (0.5–6 Hz, ±2 Hz by default)			
Input system	The mains input and bypass input can share a power source or use different power sources.			

8.7 Battery Specifications

Item	400 kVA	500 kVA	600 kVA	880 kVA
Battery voltage	360–600 V DC (30–50 batteries, 40 by default). If there are 38 or 36 batteries, the output power is derated to 90%. If there are 34 or 30 batteries, the output power is derated to 80%.			
Battery management	Intelligent battery management			
One-button cold start	In the case of a mains failure, batteries can start the UPS to power loads.			
Charger output power	Under rated conditions, the maximum charge power of a module is 15 kW.			
Battery string sharing	Battery string sharing is supported in a parallel system. No battery string is shared by default.			
Batteries with no neutral wire	Supported			
Charging voltage	• Equalized charging voltage: 2.3–2.4 V/cell. The default voltage is 2.35 V/cell. • Float charging voltage: 2.23–2.3 V/cell. The default voltage is 2.25 V/cell.			
Minimum cell voltage	1.6–1.9 V/cell			

8.8 Output Electrical Specifications

Item	400 kVA	500 kVA	880 kVA	600 kVA
Output system	Three-phase, four-wire, and PE			
Voltage	380 V AC, 400 V AC, or 415 V AC (tolerance ± 1%) (line voltage)			
Frequency	• In normal mode, the mains frequency is synchronous with the bypass input frequency. • In battery mode, the frequency is 50 Hz or 60 Hz (tolerance ±0.05%).			
Total harmonic distortion of output voltage (THDv)	• THDv ≤ 1% at rated input voltage and 100% linear load • THDv ≤ 4% at rated input voltage and 100% non-linear load			
Output PF	1			
Transfer time	• 0 ms (uninterruptible transfer) • ≤ 20 ms (interruptible transfer)			
Output voltage unbalance	Voltage unbalance: ±3%; phase unbalance: 120±2°			
Overload capability	Inverter overload capability: • 100% < load ≤ 110%: transfer to bypass mode after 60 min • 110% < load ≤ 125%: transfer to bypass mode after 10 min • 125% < load ≤ 150%: transfer to bypass mode after 1 min • Load > 150%: transfer to bypass mode after 200 ms			
	Bypass overload capability: • 110% load: run for 60 minutes • 125% load: run for 10 minutes • 150% load: run for 1 minute • 1000% load: run for 100 ms	Bypass overload capability: • At 30°C, load ≤ 135%: run for a long time • At 40°C, load ≤ 125%: run for a long time • 1000% load: run for 100 ms		Bypass overload capability: • At 25°C, load ≤ 125%: run for a long time • 1000% load: run for 100 ms

8.9 System Electrical Specifications

Item	400 kVA	500 kVA	600 kVA	880 kVA
Redundancy design	The auxiliary power supplies, centralized controllers, and parallel signals use redundancy design.			
ECO	Supported			

A (Optional) TN-C System Application

If the TN-C system is adopted, short-circuit the input N and PE. Figure A-1 and Figure A-2 show cable connections for short-circuiting the input N and PE for different UPS models. Table A-1 lists the recommended cross-sectional areas for cables.

NOTE

- Cables are connected in the same way for the 400 kVA UPS, 500 kVA UPS, and 600 kVA UPS. This section describes how to connect cables for the 600 kVA UPS.
- The following cable connections are for reference only.

Figure A-1 Short-circuiting the input N and PE (600 kVA UPS)

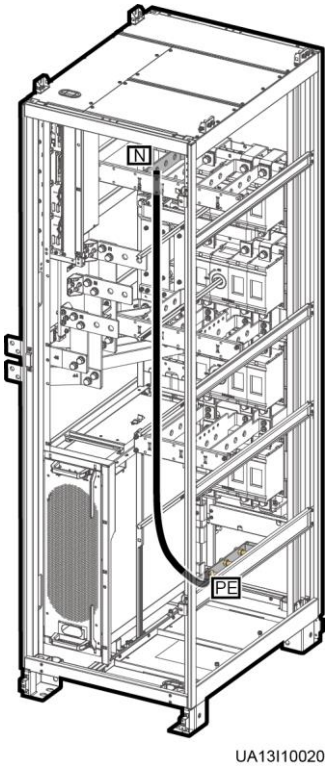


Figure A-2 Short-circuiting the input N and PE (880 kVA UPS)

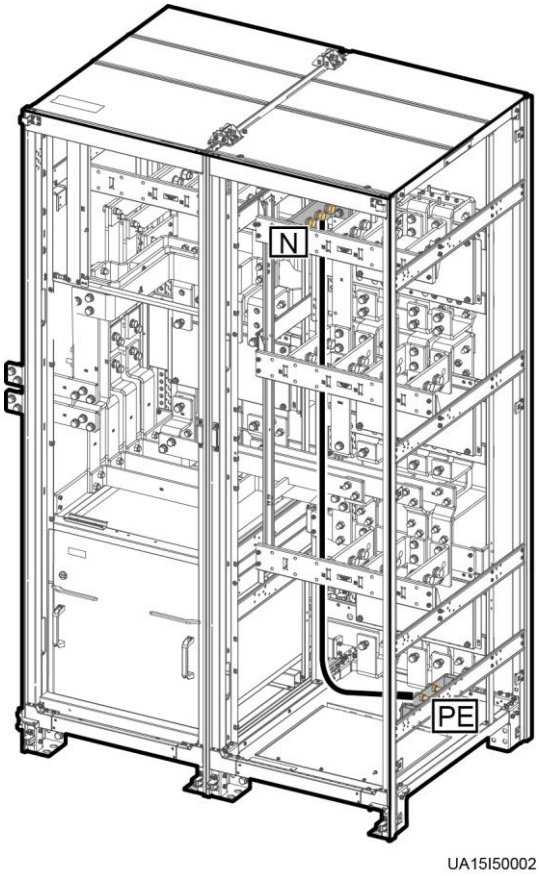


Table A-1 Recommended cross-sectional areas for cables

Model	Current (A)	Recommended Cross-Sectional Area (mm^2)
400kVA	710.8	240
500kVA	888.5	240
600kVA	1066.2	240
880kVA	1421.6	240

B Menu Hierarchy

B.1 Menus on the LCD

Level-1 Menu	Level-2 Menu	Level-3 Menu	Level-4 Menu
System Info	Runn Info	AC Output	N/A
		UPS Load	N/A
		Mains Input	N/A
		Bypass Input	N/A
		Battery Status	N/A
		Module Data	N/A
		Total Runtime	N/A
		Environment Data	N/A
	Alarms	Active Alarms	N/A
		Historical Alarms	N/A
		Buzzer Off	N/A
		Clear Faults	N/A
	Settings	Comm Settings	IP Settings
			RS485 Settings
			ModbusTCP Settings
			Amb T/H Sensor
			Batt Temp Sensor
			BMU
			WiFi Settings
		System Settings	N/A

Level-1 Menu	Level-2 Menu	Level-3 Menu	Level-4 Menu
		Input Settings	N/A
		Output Settings	N/A
		Bypass Settings	N/A
		Battery Settings	N/A
		iBOX Settings	N/A
		Dry Contact Set	N/A
		Settings Wizard	N/A
		User Settings	N/A
		DST Settings	N/A
	Maintenance	Battery Maint.	N/A
		USB Operations	Fault data
			Upgrade Software
			BSP Upgrade
			Import Config.
			Export Config.
			Multi-brand
			Remove USB
		Inv. ON	N/A
		Inv. OFF	N/A
		ECM Switchover	N/A
		Screen Calib.	N/A
	About	N/A	N/A
Common Functions	AC Output	N/A	N/A
	UPS Load	N/A	N/A
	Mains Input	N/A	N/A
	Inv. ON	N/A	N/A
	Inv. OFF	N/A	N/A
	Buzzer Off	N/A	N/A
	Historical Alarms	N/A	N/A
System Status	Bypass	N/A	N/A

Level-1 Menu	Level-2 Menu	Level-3 Menu	Level-4 Menu
	Mains	N/A	N/A
	Load	N/A	N/A
	Battery	N/A	N/A

B.2 Menus on the WebUI

Table B-1 Menus on the WebUI

Level-1 Menu	Level-2 Menu	Level-3 Menu
Monitoring	Active Alarms	N/A
	Real-time Data	UPS
		Module
	Param. Settings	System Settings
		Input Settings
		Output Settings
		Bypass Settings
		Battery Settings
		Dry Contacts
	Comm. Config.	IP Settings
		RS485 Settings
		ModbusTCP Settings
		Amb T/H Sensor
		Batt Temp Sensor
		BMU
		WiFi Settings
	iBOX Settings	Basic Param.
		Advanced Param.
		Batt. String Config
	Control	System Commands and Tests
Query	Alarm History	N/A

Level-1 Menu	Level-2 Menu	Level-3 Menu
	Logs	N/A
Config.	User Mgmt.	User Mgmt.
		Idle Timeout Logout
	Site Config.	Time zone
		System Date and Time
		DST
		System Information
		SNMP
		SNMP Trap
		Certificate Management
		Configuration Management
		Multi-brand Management
		Configure Alarm Notification Server
		Configure Alarm Notification Email Address
		ModbusTCP Certificate Management
		ModbusTCP CA Certificate Management
		ModbusTCP Authentication
		eUPS Certificate Management
	RCCMD	RCCMD
		SSL Encrypted Transmission
		Event Configuration
		RCCMD Certificate Management
Maint.	Calib	Bypass
		Module
		ECM
	Commissioning Var.	Bypass
		Module

Level-1 Menu	Level-2 Menu	Level-3 Menu
		ECM
	Upgrade Software	N/A
	BSP Upgrade	N/A
	Download	Fault Data
		iBOX version
		E-Label
	Bus cap. Life	N/A

C Alarm List

Alarm ID (Alarm ID-Cause ID)	Alarm Name	Severity	Cause	Solution
0001-1	Mains voltage abnormal	Minor	• Cable connections are incorrect. • The mains is not normal. • The power module is faulty.	1. Check whether cables to mains are disconnected, loose, or incorrectly connected. 2. If cable connections are correct, measure the mains voltage with a multimeter. If the mains voltage exceeds 280 V, the mains input is not normal; if the mains voltage is less than 272 V, the sampling circuit of the power module is not normal. Replace the faulty module.
0001-2			• Cable connections are incorrect. • The mains is not normal. • The mains input fuse for the power module is blown.	1. Check whether cables to mains are disconnected, loose, or incorrectly connected. 2. If cable connections are correct, measure the mains voltage with a multimeter. If the mains voltage is less than 80 V, the mains voltage is not normal; if the mains voltage exceeds 88 V, the power module sampling circuit or fuse may not be working properly. Replace the faulty module.
0001-3			The mains is not normal.	Check the mains.
0004-1	Mains ph. Reversed	Minor	Cable connections	Verify the cable connections.

Alarm ID (Alarm ID-Cause ID)	Alarm Name	Severity	Cause	Solution
			are incorrect.	
0005-1	Mains neutral absent	Minor	Cable connections are incorrect.	1. Secure or connect the neutral wire to the cabinet if it is loose or disconnected. 2. Check that the neutral wire to the power distribution system is normal.
0006-1	Mains undervoltage	Minor	• The mains is not normal. • The power module sampling circuit is not normal.	Check whether the mains voltage ranges from 80 V (excluding 80 V) to 176 V. If no, the mains monitoring circuit for the power module is faulty. Replace the faulty module.
0010-1	Abnormal bypass voltage	Minor	• The bypass voltage range is not correctly set. • The bypass input voltage is not normal.	1. Check the bypass input voltage or cable connections with a multimeter. 2. Check the voltage system and bypass voltage thresholds configured on the LCD.
0010-2			• The bypass frequency range is not correctly set. • The bypass input frequency is not normal.	1. Check the bypass input voltage or cable connections with a multimeter. 2. Check the bypass input frequency. Check the rated frequency and frequency range configured on the LCD.

Alarm ID (Alarm ID-Cause ID)	Alarm Name	Severity	Cause	Solution
0011-1	Bypass phase reversed	Minor	The phase sequence of the three-phase bypass input is reversed.	Check whether the cable phase sequence is correct using a multimeter. If no multimeter is available, exchange the positions of any two cables.
0012-1	Bypass neutral absent	Minor	The neutral wire of bypass input is not installed properly.	1. Secure or connect the neutral wire to the cabinet if it is loose or disconnected. 2. Check that the neutral wire to the power distribution system is normal.
0020-1	Battery connected reversely	Critical	Batteries are not properly installed.	1. Check whether battery polarities are correctly installed by using a multimeter. If no, correct the installation. 2. Check whether the battery input voltage of the UPS is normal. If yes, the battery sampling circuit of the power module is faulty. Replace the power module.
0021-1	Battery EOD	Critical	The battery voltage reaches the EOD voltage threshold due to continuous discharge.	If the BCB box is configured, check whether the BCB box trips. If it trips, close the BCB box switch.
0022-1	No battery	Minor	• There is no battery string. • The battery string is not properly installed. • The power module battery fuse is blown.	1. Check that battery cables are correctly connected. 2. Check that the battery terminal voltage is normal. 3. Check that the battery fuse in the power module is intact.

Alarm ID (Alarm ID-Cause ID)	Alarm Name	Severity	Cause	Solution
0025-1	Battery overvoltage	Minor	• The configured number of batteries is less than the actual number. • The battery neutral wire is not installed properly.	1. Check whether battery parameters are correctly set. 2. If they are correctly set, certain batteries may be faulty. 3. Check whether the battery neutral wire is correctly connected.
0026-1	Low battery voltage	Minor	• Battery discharge results in low battery voltage. • The battery neutral wire is not installed properly. • The charger is faulty.	1. If the low battery voltage alarm is generated in battery mode, check whether the mains voltage recovers. If yes, charge batteries immediately. 2. Check whether the battery neutral wire is correctly connected. 3. If this alarm is generated in normal mode, check whether the battery switch is ON. If yes, the charger may be faulty. Replace the related power module.
0530-1	Battery ground fault	Critical	• The battery string is not properly grounded. • The battery ground monitoring cable is faulty. • The dry contact board is	1. Check whether the positive and negative terminals of the battery string are grounded or have sufficient resistance to the ground. 2. Check whether the battery grounding failure detector is faulty by replacing it with a new one. 3. If no battery grounding failure detector is available, check on the dry contact board whether the battery grounding failure detector is enabled. If yes, disable it and check whether the

Alarm ID (Alarm ID-Cause ID)	Alarm Name	Severity	Cause	Solution
			faulty.	alarm is cleared. If the alarm persists, the dry contact board may be faulty. Replace the board.
0032-1	Battery overvoltage protection	Critical	• The battery voltage is greater than the upper threshold. • The configured number of batteries is less than the actual number. • The actual number of batteries does not meet requirements.	1. Check the battery voltage. 2. Check that the configured number of batteries matches the actual number. 3. Check that the actual number of batteries meets requirements.
0036-2	Battery maintenance reminder	Warning	The time for maintenance arrives.	Maintain the batteries.
0037-1	Battery undervoltage	Critical	• The UPS has worked in battery mode for an extended amount of time. • The charger is faulty.	1. Check whether the battery voltage is normal. 2. Check whether the output is overloaded. 3. Check whether any battery is damaged. If yes, replace the battery. 4. Check whether any battery charger generates an alarm. If yes, replace the faulty module.

Alarm ID (Alarm ID-Cause ID)	Alarm Name	Severity	Cause	Solution
0040-7	Rectifier abnormal	Critical	• The fan for the power module is not functioning properly. • The air channel for the power module is obstructed.	1. Check that the air channel for the module is free from blockage. 2. Check whether the fans are functioning properly. Replace the power module if the fans are faulty.
0043-1	Fan abnormal	Critical	• The fan for the power module is abnormal. • The fan monitoring cable for the power module is not working properly.	Replace the faulty power module.
0043-2			The fan is faulty.	Check the fan or replace the bypass module.
0043-3			• The fan is faulty. • The fan monitoring cable is faulty.	1. Replace the fan. 2. Check the fan monitoring cable.
0043-4				
0047-1	Not ready	Critical	The ready switch is OFF.	Close the ready switch.
0060-4	Inverter abnormal	Critical	• A load short-circuit	1. Check load cable distributions.

Alarm ID (Alarm ID-Cause ID)	Alarm Name	Severity	Cause	Solution
			occurs. • A short circuit occurs inside the module. (This fault seldom occurs.)	2. If load cable distributions are normal, replace the power module.
0061-2	Inverter alarm	Minor	• The I2C bus is not normal. • The E2PROM is faulty.	1. Rectify the fault and check whether the alarm is cleared. 2. If the alarm is generated again, replace the power module.
0061-7	Inverter alarm	Minor	The bypass waveform is not normal.	• If not all modules generate the alarm, start the UPS, transfer it to normal mode, and replace the faulty module. • If all modules generate the alarm, open the bypass input circuit breaker. After the inverter relay is closed, close the bypass input circuit breaker 10 seconds later.
0564-1	Overload timeout	Critical	• The load is excessive. • Derating reduces the rated system power. • The module is damaged.	1. Check that there is no overload. 2. Check that the module power is not derated due to a fan fault. 3. If the alarm persists, replace the power module.
0565-1	Load impact transfer-to-bypass	Minor	• A large-power RCD load is instantly connected, or the	1. Check the load. 2. If the load is normal, replace the power module.

Alarm ID (Alarm ID-Cause ID)	Alarm Name	Severity	Cause	Solution
			output load short-circuits. • The inverter bridge short-circuits.	
0566-1	Output overload	Minor	• The load is excessive. • Derating reduces the rated system power. • The module is damaged.	1. Check that there is no overload. 2. Check that the module power is not derated due to a fan fault. 3. If the alarm persists, replace the power module.
0570-4	BPM module abnormal	Critical	• The bypass fan is not functioning properly, or the air channel is blocked. • The ambient temperature exceeds the upper threshold. • The load is excessive.	1. Check the bypass fan and air channel. If the fan is faulty, replace it. 2. Check that the ambient temperature has not exceeded 40°C. 3. Check that there is no overload.
0583-1	Inter-rack par. cable abnormal	Critical	• The inter-rack parallel system CAN bus is	1. Check the inter-rack parallel system CAN bus. 2. Rectify the disconnection or short-circuit fault. 3. Replace the ECM.

Alarm ID (Alarm ID-Cause ID)	Alarm Name	Severity	Cause	Solution
			disconnected or short-circuited. • Only one rack works in a parallel system. • An ECM is faulty.	
0583-4			The inter-rack industrial frequency synchronization cable is broken.	Replace the inter-rack parallel cable.
0583-5			The inter-rack carrier synchronization cable is broken.	
0583-6			• The intra-rack INVBYP cable is broken. • The parallel CAN bus is broken.	
0584-2	Inter-rack par. cable alarm	Minor	The inter-rack parallel cable is faulty.	Replace the inter-rack parallel cable.
0584-4			The inter-rack industrial frequency synchronization cable is broken.	

Alarm ID (Alarm ID-Cause ID)	Alarm Name	Severity	Cause	Solution
0085-1	EPO	Critical	The EPO button is pressed.	Restore the EPO button status. Start the UPS after the alarm is cleared.
0086-1	Max. number of BPM transfers	Minor	The system frequently transfers to bypass mode due to overload timeout or load impact.	Check the load.
0087-1	System transfer-to-bypass	Warning	The neighboring UPS is not normal, and transfers to bypass mode.	Check the reason why the neighboring UPS transfers to bypass mode.
0088-1	Rack address conflict	Critical	The configured rack address conflicts with another one.	Check the rack address setting.
0089-1	Rack output overload	Minor	• The load is excessive. • The rack capacity setting is not appropriate.	• Check the load and remove some loads or expand the UPS power capacity if the UPS is overloaded. • Check that the configured rack capacity meets requirements.
0090-1	Dry contact board fault	Critical	I2C communication with the dry contact board MUE05A fails.	Replace the dry contact board MUE05A.
0090-2			I2C communication with the dry contact board	Replace the dry contact board MUE06A.

Alarm ID (Alarm ID-Cause ID)	Alarm Name	Severity	Cause	Solution
			MUE06A fails.	
0356	Battery Mode	Minor	The UPS is working in battery mode.	The running status is displayed. See details about how to handle other alarms.
0359	No power supplied	Warning	No power is supplied.	The running status is displayed. See details about how to handle other alarms.
0332	Output disabled	Minor	The output is disabled.	The running status is displayed. See details about how to handle other alarms.
0337	PDC bypass input breaker open	Critical	The bypass input circuit breaker on the PDC is OFF.	The running status is displayed. No further measures are required.
0338	PDC output breaker open	Critical	The output circuit breaker on the PDC is OFF.	1. Check that all UPS output circuit breakers are ON. 2. On the LCD, check that **PDC output breaker open** alarm has disappeared. If the alarm persists, tap the **Clear Fault** button to clear the alarm.
0341	PDC Maint. breaker closed	Minor	The maintenance circuit breaker on the PDC is ON.	The running status is displayed. No further measures are required.
0342	Mains input breaker open	Critical	The mains input circuit breaker is OFF.	The running status is displayed. No further measures are required.
0343	BPM input breaker open	Critical	The bypass input circuit breaker is OFF.	The running status is displayed. No further measures are required.
0340	Maint. breaker closed	Minor	The maintenance circuit breaker is	The running status is displayed. No further measures are required.

Alarm ID (Alarm ID-Cause ID)	Alarm Name	Severity	Cause	Solution
			ON.	
0335	Generator connected	Warning	The generator is connected.	The running status is displayed. No further measures are required.
0594-1	Insufficient redundant racks	Minor	• The load is excessive. • The configured number of redundant racks is incorrect.	1. Reduce the load. 2. Decrease the configured number of redundant racks.
0095-1	Insuffi. redundancy	Minor	• The load is excessive. • The configured number of redundant modules is incorrect.	1. Reduce the load. 2. Decrease the configured number of redundant modules.
0096-1	ECO volt. Abnormal	Minor	• The ECO bypass voltage or frequency is out of the preset range. • The ECO bypass voltage or frequency range is incorrectly set. • The bypass input sequence is reverse or the	1. Check the bypass input voltage and frequency. 2. Check that the rated voltage, rated frequency, ECO bypass voltage range, and frequency range are correctly set. 3. Check that the bypass cables and circuit breakers are correctly connected.

Alarm ID (Alarm ID-Cause ID)	Alarm Name	Severity	Cause	Solution
			neutral wire is disconnected.	
0098-1	Bypass current not shared	Minor	• The output and input circuit breakers are OFF. • The length of the bypass input or output cables is incorrect. • The bypass SCR open-circuits.	1. Check that the output and bypass input circuit breakers on each rack are ON. 2. Check that bypass input and output power cables on each rack meet the length requirements. 3. Rectify any bypass SCR open-circuit.
0150-1	Inverter asynchronous	Minor	• The bypass frequency changes fast. • The output frequency track rate is incorrectly set.	1. Check that the bypass output frequency does not change fast. 2. Check that the **Output freq. track rate** is properly set.
0101-1	BSC signal abnormal	Minor	• The dual bus connector is loose. • Parameters are set incorrectly.	1. Check the dual bus connector. 2. Check the parameter settings.

Alarm ID (Alarm ID-Cause ID)	Alarm Name	Severity	Cause	Solution
0102-1	Maint. breaker misoperation	Critical	The user operation is incorrect.	1. Shut down the inverter and then close the maintenance circuit breaker. 2. After maintenance, open the maintenance circuit breaker and then start the inverter.
0380	In self-check	Warning	The inverter is in self-check.	Wait until the inverter self-check is complete.

D Acronyms and Abbreviations

A	
ATS	AC transfer switch
AWG	American wire gauge
B	
BSC	bus synchronization controller
BCB-BOX	battery circuit breaker box
BBB-BOX	battery bus bar box
C	
CE	Conformite Europeenne
D	
DSP	digital signal processing
E	
ECO	economic control operation
EPO	emergency power off
ECM	energy control module
EOD	end of discharge
I	
IEC	International Electrotechnical Commission
L	
LCD	liquid crystal display
M	
MDU	monitor display unit
P	

PE	protective earthing
PDU	power distribution unit
R	
RS485	Recommend Standard 485
S	
SOC	state of charge
STS	static transfer switch
SNMP	Simple Network Management Protocol
T	
THDi	total distortion of the input current waveform
THDv	total harmonic distortion of output voltage
U	
UPS	uninterruptible power system
USB	Universal Serial Bus
V	
VRLA	valve-regulated lead acid battery

